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CHARLES ELMORE CROPL

IN THE

Supreme Court of the United States

OCTOBER TERM, 1943.

No. 392

UNIVERSAL OIL PRODUCTS COMPANY,
A CORPORATION,
Petitioner,

vs.

GLOBE OIL & REFINING COMPANY, A CORPORATION,
Respondent.

BRIEF FOR RESPONDENT.

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BRIEF FOR RESPONDENT.

The Opinions Below.

The opinion of the Circuit Court of Appeals for the Seventh Circuit (Judges Evans, Major and Lindley) in the instant case is reported in 137 F. (2d) 3, and is also found at page 3575, Volume VII of the record herein. The majority of the Seventh Circuit Court of Appeals did not pass on the validity of either the Dubbs or Egloff patents but held that their claims were not infringed. The Court reached this conclusion as to the Dubbs patent by refusing to adopt petitioner's theory of a special meaning

for the word "vaporization," and as to the Egloff patent by a consideration of the antithetical nature of its disclosure when compared with the respondent's process. Judge Lindley concurred in the result on the ground that both the Dubbs and Egloff patents were invalid.

The opinion of the District Court for the Northern District of Illinois, Eastern Division, is reported in 40 F. Supp. 575, and is also found in Volume VI of the record herein at page 3035. District Judge Holly held the Dubbs patent valid but not infringed, and the Egloff patent invalid.

The Jurisdictional Question.

The jurisdiction of this Court was invoked because of an apparent conflict between the Third and Seventh Circuits. If, however, the Third Circuit Court of Appeals, in proceedings now pending before it, should affirm the report of a Special Master finding that its decision in *Root Refining Company* v. *Universal Oil Products Company*, 78 F. (2d) 991 (hereinafter called the "*Root*" case), was obtained by bribery of a member of the court which rendered the decision, then, *first*, the writ of certiorari will appear to have been improvidently granted, for there would never have been in existence a valid conflicting decision; and, *second*, Universal Oil Products Company's right to invoke equitable relief with respect to these patents in this, or in any other court, would be forever forfeited. The question is so unprecedented and so serious that we respectfully submit that this Court should take no action in this case on the merits unless and until the Third Circuit Court of Appeals shall clear Universal of the imputation of corruption and unclean hands under which it now stands. The Master's Report, comprising 95 printed pages, was filed on October 19, 1943. It finds that there was "such fraud as tainted and invalidated the judgments" rendered on ap-

peal in the *Root* case, and that the fraud consisted in the fact that Universal Oil Products Company through its attorney, one Morgan S. Kaufman, extended monetary favors to J. Warren Davis, a former judge of the Third Circuit Court of Appeals, in return for a favorable decision in that case. The Court of Appeals for the Third Circuit will hear arguments on the Master's Report during March, 1944. Should the Report be affirmed and adopted, Universal will stand convicted of the most heinous offense of which a litigant can well be guilty. The history of this corruption is not contained in the record now before this Court. Nevertheless, it would be a most notorious abuse of the process of the courts if, on any present assumption of Universal's innocence, its rights should be passed on, only to have it appear subsequently, on the record now before the Third Circuit Court of Appeals in the *Root* case, that Universal had long ago forfeited its standing in any court of equity with respect to the patents here in suit.

The Questions Presented.

The record herein shows that long prior to the *Root* decision in the Third Circuit Court of Appeals and to Universal's unclean hands in connection therewith, and while the Dubbs patent was in interference with an application (owned by The Texas Company) of one Otto Behimer, Universal proceeded, in callous and cynical disregard of law and ethics, to attempt to pilfer its opponent's private documents, and to bribe its employees, and that finally, when these efforts failed, and while the interference was still pending, Universal clandestinely hired away the rival inventor, Otto Behimer, by contracting to pay him the sum of $225,000.00, and that, when once Universal had Behimer in its employ under a long-term contract, it caused him to disparage and repudiate his early work. The

District Court held that these admitted facts* did not constitute "unclean hands." The Court of Appeals did not pass on the question. The views of this Court in *Keystone Driller Co.* v. *General Excavator Co.*, 290 U. S. 240, indicate that such conduct is, in itself, sufficient to bar a plaintiff from any standing in a court of equity.

On the merits, the questions presented are the customary ones of validity and infringement of both patents.

As to the Dubbs patent the decisions below in favor of respondent turned on the effect to be given to a limitation in each claim requiring that the oil in a first step should be brought to the cracking temperature in a heating coil; "but without substantial vaporization" of the oil therein. In the respondent's process the oil in the corresponding first step is vaporized to the extent of 85% by weight and 95% by volume. The District and Circuit Courts held that this, obviously, constituted the "substantial vaporization" forbidden by the claim limitation. Both courts also emphasized other vital differences between the accused process and that of the Dubbs patent.

Anticipation of the Dubbs patent is shown by the prior disclosure of Otto Behimer, who, on November 21, 1918 (three months before Dubbs filed on March 19, 1919), filed an application for patent containing every step and feature of the Dubbs disclosure. The District Court held that Behimer did not anticipate because of the supposed inoperativeness of his means for returning the reflux condensate from the fractionator to the coil inlet. Other prior

* These events occurred over the period from 1925 to 1927, prior to the filing of the bill of complaint herein on July 22, 1931 (I, 15). Respondent was first put on notice of petitioner's unclean hands on December 17, 1937 (I, 58-62), and the proofs relating thereto were adduced in separate hearings before the District Court beginning in April, 1938.

art patents also fully disclose the so-called "clean circulation" steps which petitioner asserts as the novelty in Dubbs. The District Court held adversely to respondent on this issue, but in the higher court Judge Lindley, who was the only judge passing on the question, found Dubbs to be anticipated.

As to the Egloff patent, the lower court found invalidity because of lack of utility and invention, and the higher court rested its decision on noninfringement, although Judge Lindley agreed with Judge Holly that the patent is invalid. Our discussion of this patent will be confined to the Argument (*post*, pp. 143-159).

STATEMENT OF THE CASE.

THE PARTIES.

Petitioner is, and always has been, a patent-holding and licensing company, dealing with patents in the petroleum and refining industry. Its interest lies, therefore, in dominating the art by patent licensing arrangements so as to insure to itself the largest possible tribute by way of royalties.

Substantially all of petitioner's capital stock is held or controlled by Standard Oil of California, the Royal Dutch Shell group and the Gulf Refining Co. (II,* 560). This stock purchase was aided and financed, in part, by The Texas Company, Standard Oil of Indiana, and Standard Oil of New Jersey (I, 524).

Texas and Standard of Indiana each owns patents relating to the refining industry and each issues licenses under its respective patents (I, 227; II, 560-1).

At the time of the trial, petitioner had licensing rights under all of the patents owned by these companies (including the Behimer patent No. 1,883,850, owned by The Texas Company, and which petitioner now says is invalid), and had granted immunity under its patents to each of them and to their licensees, receiving in return immunity for itself and its licensees under patents held by these other companies (I, 226-7, 229).

* Throughout this Brief, Roman numerals refer to the volume, and Arabic numerals to the page, of the Record on Appeal, and emphasis is ours unless otherwise noted. Plaintiff's and Defendant's Exhibits are designated respectively "PX." and "DX." Universal Oil Products Company is sometimes referred to as "Universal."

As part of a general settlement agreement entered into with The Texas Company in 1931, two interferences, No. 49,355 involving, so it was claimed, "clean circulation" broadly, and No. 55,610, involving "clean circulation" with a hot oil pump, were terminated in such manner that, by agreement (1, 227-9), Universal got the counts in No. 49,355 (corresponding to the claims of the Dubbs patent in suit) and The Texas Company got the counts in No. 55,610 (which became certain of the claims of Behimer patent 1,883,850). By that time the whole industry had adopted the hot oil pump, so that the practical result of the settlement was the division of the asserted monopoly of clean circulation" between the two parties, with the apparent right to exclude the public therefrom for the period from 1921, when the Dubbs patent issued, to 1949, when the Behimer patent will expire. In consequence, those who have refused to take licenses have had to defend against two patents, Dubbs 1,392,629, owned by Universal, and Behimer 1,883,850, owned by The Texas Company, each asserted to cover the same invention.* These facts do not support petitioner's self-righteous pose (Br. pp. 29-30) as the champion of the independent refiner against the giants of the industry. This 1931 settlement admitted Universal to the patent pool (comprising among others, The Texas Company, Standard of Indiana, and Gasoline Products Company) which had been under investigation in *Standard Oil Company* v. *United States*, 283 U. S. 163.

Respondent, an Illinois corporation, is not a patent licensing company, but operates an oil refinery at Lemont,

* This is apparent from the decision in *The Texas Company* v. *Anderson-Prichard Refining Corporation*, 32 F. Supp. 347, affirmed, 122 F. (2d) 829. The Texas Company made the same claims of commercial success, widespread acceptance in the art and payment of millions of dollars in royalties for the Behimer "clean circulation" patent that petitioner makes for the Dubbs patent in the case at bar.

in the Chicago area. Its capital stock is owned by private individuals. Respondent is in direct competition with the major refining companies which own Universal's capital stock. Respondent was one of a number of independent refiners, all of whom, soon after each had purchased and was using a coil cracking unit known as the Winkler-Koch cracking still,* were charged with infringement of numerous patents held, not only by petitioner, but by The Texas Company, Standard of Indiana, and Gasoline Products Company. The independent refiners arranged to give financial aid to such of their number who might have a suit, or suits, instituted against them. For this purpose, a defense fund wa formed, to which each of the users of Winkler-Koch cracking stills contributed, for the purpose of defending infringement suits and vindicating the cracking stills used by them from unwarranted claims of patent infringement. These independents realized full well that their individual financial resources were not adequate to meet the overwhelming attack brought against each of them by the major refiners and patent-holding companies in this industry (I, 41, 43, 54).

Not less than thirty patent infringement suits, each declaring on not less than two patents, and some on as many as ten patents, were brought against individual users of Winkler-Koch cracking stills (I, 44-51; V, 1995-7) in an effort by the major companies to compel them to pay tribute to these patents, or to cease operating.

The case at bar is the second patent infringment suit

* Respondent's still was designed and built by the Winkler-Koch Engineering Company of Wichita, Kansas, and was purchased from that company by the respondent. Petitioner insinuates (Br. pp. 40-1) that because Winkler was once a Universal employee, he copied the "Dubbs Process" in the Winkler-Koch still. However, this still is so diametrically opposed to the Dubbs plants that it would be fairer to say that Winkler learned how *not* to conduct a cracking process when he was with Universal. Neither Koch nor Perdew was ever employed by Universal.

tried against the respondent,—the first being *Standard Oil Company* v. *Globe Oil & Refining Company*, 82 F. (2d) 488. Other suits which have been tried against independent refiners because of their use of Winkler-Koch stills, are *Universal Oil Products Company* v. *Root Refining Company*, 78 F. (2d) 991, *Gasoline Products Company, Inc.* v. *Champlin Refining Company*, 86 F. (2d) 552, and *The Texas Company* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829. In all of these cases, save the now suspect *Root* case, the decisions of the Courts, both below and above, held the patents in suit either invalid or not infringed.

Petitioner formerly contended that the decree on appeal in the *Root* case was *res adjudicata* against all those who had contributed money to the defense of that case. It dropped the contention when the Third Circuit Court of Appeals was asked to order an investigation into the question of fraud in the *Root* case, even going so far as to ask the District Court, in the case at bar, to give the decision on appeal in the *Root* case no effect "as a precedent or as having any other effect in the Globe case favorable to Universal" until the fraud investigation should be settled. Notwithstanding this fact, and the further fact that the Master's Report has now found Universal guilty of bribing a judge of the Court of Appeals in the *Root* case, Universal has the temerity to rely on that decision as a precedent in its favor in its Brief before this Court.

PETITIONER'S UNCLEAN HANDS WITH RESPECT TO PRIOR INVENTION BY OTTO BEHIMER.

The testimony relating to this issue is found in Volume I of the record from pages 85 to 460. Many witnesses were called and ten days were consumed in hearing their testimony. Without exceeding a reasonable limit to the length of this Brief, it is impossible to set forth this evidence in any detail.

The Dubbs-Wannack-Olsen-Kaufman Episodes. — On April 18, 1923, Interference No. 49,355 (V, 2052) was declared by the Patent Office to determine priority of invention of all claims of the Dubbs patent except the very narrow claim 6. After filing a preliminary statement of the dates of the Dubbs invention, Universal obtained access to its opponent's application file. Here, Universal and Dubbs learned that the application of Holmes, Manley, and Behimer (owned by The Texas Company, and amended later to be the sole application of Behimer) disclosed the same invention as that of the Dubbs patent, and that Behimer had an earlier filing date than Dubbs, in consequence of which Dubbs was the junior party carrying the burden of proof.

Faced with this situation, Universal first unsuccessfully moved to amend Dubbs's preliminary statement to allege earlier dates, and to shift the burden of proof (V, 2066 to 2084). Failing in this, Universal departed from the usual course of interference litigation. It did not proceed with the taking of testimony to carry Dubbs's date back of Behimer's filing date,* which, ordinarily, would have required The Texas Company to reveal the true facts as to Behimer's early work. Instead, it put Dubbs in charge of what it calls an "investigation" to determine the strength or weakness of the proofs of The Texas Company (I, 395).

Concerning this "investigation," the evidence shows that for a period of over two years, Universal's agents, Howard, Olsen, Wannack and Kaufman,

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* Universal, to the present day, has never adduced testimony showing any actual work by Dubbs prior to his filing date of March 19, 1919.

endeavored to obtain access to the private files of The Texas Company by bribing, and offering to bribe, its employees. The plan (I, 138) which in two instances was successfully carried out (I, 112, 146-7) was to secretly abstract drawings and correspondence from the files, photograph them, and return the originals so as to avoid detection of the theft. During the course of the "investigation," attempts were made to get affidavits from The Texas Company's employees showing that Behimer's early experiments, on which his applications for patent were based, were failures. One such affidavit, drawn for the signature of Maurice Beyt, Behimer's confidential clerk, was, in the words of Beyt (DX. 202, I, 218) false "in a great many substantial and material particulars." The climax of the activities of Universal's "investigators" was reached when Otto Wannack caused a duplicate set of keys to be made to Behimer's private filing cabinet, and delivered them to one George White, a Texas Company employee, with instructions to "ransack the files" (I, 145-6). White, however, was honest, and the plot was foiled. Universal's full knowledge of, and responsibility for, the acts of its "investigators" is shown by the following facts: It received and did not return photographs of drawings which had been abstracted from The Texas Company's files (I, 112, 424); its responsible officer, Carbon P. Dubbs, went to Beaumont, Texas to interview Texas Company employees who had been lined up by Wannack (I, 350, 397) and thereafter kept in close touch with the "investigators"; Dubbs corresponded with Wannack under the assumed names (I, 250) of "Egeler" (Dubbs) and "Cal Smith" (Wannack); Dubbs sent Wannack over $13,000.00 (DX. 234, 235, V, 2261-2337) in cash (I, 250-7) through the mails (never by check or money order); and Dubbs kept Wannack at work on the "investigation," even

after he, Dubbs, had learned of Wannack's having caused the manufacture of the duplicate set of keys (V, 2359). Although Dubbs professed to have been shocked when he learned of this incident (I, 401), he thereafter executed an affidavit (DX. 248, I, 435-6) extolling Wannack as "temperate, reliable, and worthy of confidence" and as having "always respected the laws and customs of the People of the United States * * *."

Universal's Conduct in Hiring Behimer Away From the Texas Company for $225,000.00.—Having failed in its efforts through "investigations" to get proof of the supposed failure of Behimer's early work, Universal determined upon an even bolder course. It decided to cripple its adversary by getting the rival inventor, Otto Behimer, into its own camp. Its decision must have been crystallized by the following facts: On February 9, 1927, Universal's Motion to Dissolve, based on the alleged inoperability of Behimer's jet pump was denied in Interference 49,355 (V, 2104-2108); on May 16, 1927, Standard Oil of Indiana filed its answer in an infringement suit brought by Universal on the Dubbs patent here in suit and alleged Behimer to be the prior inventor (DX. 245a, V, 2355); on June 10th, the application of Holmes, Manley, and Behimer involved in the interference was changed to the sole application of Behimer,—Holmes and Manley filing affidavits to the effect that Behimer was the sole inventor (V, 2047); on June 30th, The Texas Company filed its answer (DX. 243, V, 2355) in an infringement suit on the Dubbs patent and pleaded prior invention by Behimer, and on July 12th, Standard Oil of Indiana counterclaimed (DX. 245b, V, 2355) for an adjudication that Behimer was the prior inventor and that the Dubbs patent was void. Moreover, on July 15th, another interference, No. 55,610 (DX. 179,

V, 2118) was declared by the Patent Office between the same application by Behimer and another application by Dubbs. The issue of this interference was similar to that in Interference No. 49,355, but included the requirement that the reflux be returned to the inlet of the coil under "forced mechanical pressure" (a pump).

Universal had learned that Behimer's father lived at Harlingen, Texas, and maintained a close relationship with his son. On July 17, 1927, Murray, Dubbs and Kerr, agents of Universal, met in Brownsville, Texas, to discuss means of contacting Behimer (I, 179-180). At that date, Dubbs wired Universal's Vice President, Dunham, from Brownsville, saying (DX. 225, I, 270):

> "Attorney [Murray] was unsuccessful with Texas party hence have taken matters in my hands and having them help."

Through the president of the Harlingen bank (a man named Thompson) Dubbs and Kerr secured an introduction to Behimer's father and discussed with him the terms upon which Behimer might be employed by Universal (I, 171). As a result of these negotiations, Dubbs, on July 20th, wired Dunham, stating (DX. 228, I, 271):

> "• • • it may be very necessary to pay the twenty-five thousand bonus in spot cash. • • • I do not want my name to appear • • •"

The mention in this telegram of *the* $25,000 bonus is significant in that it shows Universal's readiness to pay a large sum of money to get Behimer, although Behimer had not, prior to this time, engaged in any discussion as to terms of employment. The reply that this telegram evoked from Universal's lawyer in Chicago, Mr. Alexander F. Reichmann, is most significant. Mr. Reichmann wired Dubbs on July 22, 1927 (DX. 230, I, 272):

> "Suggestions outlined your telegrams wholly un-

acceptable and cannot be considered Stop Understanding was that intended negotiations were based on information that party desired to make change in his employment stop. On that basis company's understanding was negotiations with him would be conducted openly and in regular manner Stop Combined judgment and desire is you drop matter and return at earliest convenience for conference."

In explaining the reason for Mr. Reichmann's telegram of protest, Mr. Dunham, then Vice-President of Universal, testified (I, 447):

"It was the question of paying a bonus in advance. A bonus is not paid in advance."

Mr. Reichmann's protest was unavailing, however, for after a conference of Universal's officials in Chicago, Dubbs returned to Harlingen with authority to proceed.

Early in August, The Texas Company obtained Behimer's signature to his preliminary statement in Interference No. 55,610 (V, 2126). The very next day, August 13th, Behimer was called to Harlingen by a telephone call from a friend, one McClosky (now dead). Thompson, the bank president stated positively (I, 172-3) that McClosky was approached to aid in the plan of getting Behimer to Harlingen and that McClosky based his summons solely upon the ground of Behimer's father's illness. When once in Harlingen, Behimer, of course, met both Kerr and Dubbs, and after a week's discussion executed an employment contract with Universal. This contract (DX. 231, I, 272-4) was for a period of ten years and provided for a basic salary of $15,000.00 a year to Behimer, plus a guaranteed minimum bonus of $5,000.00 a year for the first five years, and $10,000.00 a year for the next five years, or a total of $225,000.00.* The contract also provided for an

* Behimer's then salary from The Texas Company was $10,000.00 a year (V, 1997).

advance to Behimer of $25,000.00 as a loan against his first five years' bonus (I, 274). Thus, although Mr. Reichmann had protested against a bonus of $25,000.00 *in "spot cash,"* Universal paid the bonus cloaked as *a loan* repayable over a period of five years. *Of course, the latter arrangement had the advantage of helping to insure Behimer's allegiance for at least that period of time.*

Behimer did not return to Port Arthur, but, at Dubbs's suggestion, notified The Texas Company by mail that he was resigning, and left for California, instructing his parents to tell no one where he was (I, 296-7). In Los Angeles, Behimer stayed for approximately three weeks with Dubbs, Olsen, Kerr, Hall, and Murray (I, 298),—all agents or attorneys of Universal. Kerr registered for the entire group under an assumed name as "McWade and party" (I, 181). Murray testified that on the train to California, Dubbs told him that "now certainly they could get at the facts" (I, 180). *Murray also testified that while in California he looked at various records with Behimer and Dubbs* (I, 181).

During this period The Texas Company was searching in vain for Behimer (I, 208-9).

In the middle of September, Behimer and Dubbs returned to Chicago and set up quarters in Dubbs's home in Wilmette. Here for three weeks they collaborated (I, 314, 406) in preparing a 95-page affidavit regarding Behimer's early work, together with numerous drawings of the apparatus developed by him. On September 28th, they were joined by Beyt, Behimer's confidential assistant at The Texas Company, who, at that date, executed a ten-year employment contract with Universal (DX. 237, V, 2341). Beyt testified that he brought with him a batch of

papers,* including copies, which he had made, of the Behimer records (I, 357-8).

Behimer's affidavit for Universal was signed on October 5, 1927 (I, 335). Behimer testified (I, 318) that this affidavit "only recites the more adverse side of it, [his early work], and the favorable part is just not stressed in it." That this affidavit is inconsistent with the actual facts and with the facts that Behimer would have testified to had he remained in The Texas Company's employ, appears from a comparison of the Universal affidavit (I, 315-7, 319, 321-2, 341-3, 344-5, 346-7) and the statement which Behimer had dictated for The Texas Company that same summer (I, 312-4, 320, 345-6).

The pernicious effect of Behimer's change of allegiance and of the affidavit which he signed for his new employer, is illustrated by events that followed. The Texas Company had found it necessary to file an amended preliminary statement in Interference No. 55,610, between Dubbs and Behimer, and, accordingly, on October 6, 1927, presented such an amended statement (DX. 197, I, 206) to Behimer and requested his signature. *Behimer testified* (I, 300) *that he submitted this document to Universal's attorneys for their approval.* He did not sign it, and after holding it until March 27, 1928, Behimer definitely declined to sign, stating in a letter to The Texas Company (DX. 196, I, 203):

> "* * * I would not now execute a preliminary statement alleging the date of reduction of the invention to practice as it appears in both the original and amended statements, *since I am now of the opinion that the operation on which this date was based did not constitute a legal reduction of the invention to practice.*"

* The lower court declined to require the production of these papers on the ground that they were immaterial (I, 359 to 362, 367 to 375).

Behimer testified that this letter was composed by Universal's counsel after he had been told by them that his early work was not a reduction to practice (I, 301, 304). He admitted that he signed the letter, although he had personally "always been convinced" that the jet pump worked in his original experiment (I, 306).

In the meantime, on November 16, 1927, Behimer had received his advance of $25,000.00 from Universal and had signed notes for its repayment. The substance of the documents then executed (DXs. 232, 233, I, 274-280) was that if Behimer should remain in Universal's employ for the next five years, or die, or become incapacitated, the notes would be cancelled, but if he severed his connection with the company, his right to future bonuses ended, *and he became personally liable for the unpaid notes.* By such unscrupulous means Universal insured Behimer's allegiance.

In 1936, Hiram J. Halle, Universal's president, inadvertently disclosed his real motive in hiring Behimer. He volunteered the remark, while in conference with one Ringolsky, a Kansas City attorney, and his client, one Danciger, that he, Halle, "stole Behimer" from Dearborn (patent counsel for Texas) and that "if Dearborn thinks that he will ever take his deposition or cross-examine him, he is mistaken" (I, 87, 101). When Ringolsky's testimony as to stealing Behimer was read to Halle, the latter stated that with certain immaterial exceptions, Ringolsky's testimony was "correct" (I, 382).

The accuracy of Halle's characterization of the hiring of Behimer is reflected by an occurrence in March, 1937. At this time, Dearborn approached Behimer for the purpose of eliciting his cooperation in pending litigation involving the Behimer patent in the Tenth Circuit. Behimer told Dearborn that his, Behimer's, retainer to Universal would

not expire until January, 1938, and that in the meantime Behimer would prefer not to discuss his early work with The Texas Company, because, as he said, "*I would prefer not to be on both sides of the case*" (I, 308).

From August 13, 1927, until December, 1937, The Texas Company, the assignee of the entire right, title, and interest to the Behimer inventions, held no conference with the inventor (I, 308) and by the time that Behimer again became available, when he felt that on the expiration of his Universal contract he would no longer be on both sides of the fence, the Dubbs patent had less than one year to run.

Petitioner's unclean hands with respect to the equity here asserted has been such that it is not entitled to any relief in a court of equity.

THE NATURE OF THE CRACKING PROCESS AND THE STATE OF THE COMMERCIAL ART PRIOR TO DUBBS.

Temperature and Time Produce Cracking.—Cracking is a chemical reaction wherein heavier hydrocarbons are decomposed or cracked into lighter material upon being subjected to a sufficient *temperature* for a sufficient period of *time*. Both factors are equally necessary. Of the relation of temperature to time, H. V. Smith,* called as a witness by respondent, testified as follows (III, 1060-1061):

> "A. Cracking being a chemical reaction it is not brought about by the application of temperature alone. Temperature must be applied for a period of time in order to bring about substantial cracking. We might make an analogy to this in the operation of baking a loaf of bread. We do not create a loaf of

* At the time he testified, Mr. Smith was Chief Chemical Engineer for the Barber Asphalt Corporation. He had been actively engaged in the business of refining oil since 1924, both as a practical worker and as a designer and superintendent of cracking equipment (III, 1056-7).

bread out of raised dough simply by heating the dough to a baking temperature, we have to put the dough in the oven and heat it up and then keep it there for a period of time in order to make a finished loaf of bread. * * * In the same way, cracking is accomplished by applying a cracking temperature to the oil for a period of time and, of course, the longer we apply any particular cracking temperature to a particular oil the more cracking we get. * * * The higher or greater the temperature used the faster the rate at which cracking progresses. * * * These facts have led to what has become known as the doubling rule which states that the rate of cracking doubles for an increase in temperature of approximately 20° degrees Fahrenheit."

The cracking process was well known long prior to Dubbs's entry into the field. In the earliest cracking processes, kerosene was the desired product because of its extensive commercial use before the advent of electric lighting. Neither patent in suit is limited to cracking for gasoline. Neither even mentions the word "gasoline". The claims of both read equally on a process for cracking to make kerosene or gasoline. Hence, prior art directed to cracking to make kerosene is just as pertinent as prior art directed to cracking for gasoline.

The Carbon Problem in Cracking.—The principal problem in commercial oil cracking results from the formation of carbon or coke. Carbon forms when the heavy carbonaceous constituents of the oil are broken down by cracking and are no longer soluble in the main body of oil. In this condition they stick to whatever surface they contact, and on heated surfaces they build up a solid layer which acts as an insulator against passage of heat into the oil with consequent overheating of the metal. Many disastrous explosions and fires have resulted from coke deposition on heated shells and tubes.

These heavy carbonaceous constituents are black in color and nonvolatile. Hence, their presence in an oil may be recognized by the dark or black color, as in most crude oils and all cracked residues. They may be removed from an oil most readily by distillation, whereby the distillate, as gas oil or kerosene, is recovered as an overhead product, free from these pernicious materials which remain as residue. Oils which contain these heavy constituents are classed broadly as dirty stocks, and those from which they have been removed as clean stocks.

Very little cracking of a dirty stock may take place before carbon begins to form and deposit (Smith, III, 1064). When a clean stock is cracked, lighter products predominate, but heavier products also are formed. These heavier products in turn crack and form both lighter and heavier products, and this, continued long enough, will eventually produce heavy carbonaceous constituents whose further cracking forms carbon. Thus a clean stock may be cracked so as to produce a substantial yield of gasoline without producing any appreciable amount of carbon, by stopping the cracking at the proper stage of degradation of the heavier products (Smith, III, 1064). Respondent's process avoids carbon formation in this way.

The Dubbs patent is directed to a different solution of the carbon problem. Almost all cracking processes, both prior and subsequent, to Dubbs, dealt, and deal, in some way or another, with this problem.

Commercial Processes Prior to Dubbs; Drum Cracking, and Coil Cracking, Processes, and How They Met the Carbon Problem.—In the once widely-used Burton gasoline making process of the Standard of Indiana, a clean gas oil charge was heated and cracked in a large drum set directly over a furnace and the cycle was limited to forty-eight hours, half

of which was productive. Each run was terminated when approximately 50% of the charge had been converted into pressure distillate. Experience showed that if a higher yield was attempted, the oil under treatment began to deposit carbon in such quantities as to make the operation highly dangerous (I, 488). The Burton process was a batch operation.

Coil cracking processes were likewise limited to the use of a clean stock and a restricted amount of cracking, but were continuous rather than batch operations. In The Texas Company's gasoline making process, carried on at Bayonne, New Jersey, in 1916-17, the clean kerosene stock was continuously pumped through the coil, wherein it was heated and cracked and largely vaporized, and was then passed to a vapor separator from the bottom of which the residue was withdrawn and not returned to the system, and from the top of which vapors were taken to a fractional condenser and thence to a final condenser. The operation was of the "once-through" type; reflux condensate was not recycled to the coil inlet during the run (II, 846-56). This process was successful and the resulting product was sold commercially. The too high cost of operation did not make the process inoperable.

These prior art commercial cracking processes had this in common,—*they cracked the oil in the same part of the apparatus in which all the cracking heat was imparted*; and, therefore, they were restricted to the use of a clean charging stock, and the cracking operation had to be stopped short of the point of dangerous carbon formation.

Residue Withdrawal and Its Non-Return to the System Was Old Long Prior to Dubbs.—In both batch drum cracking and continuous coil cracking operations to make gasoline, it was well understood in the art, long prior to Dubbs,

that the dirty residue formed in the cracking operation could not be used as a charging stock.* In the Burton process, the residue remaining in the drum after the still was shut down was removed and distilled, and only the clean distillate stock was used as a charge to subsequent operations (I, 494-5).

In the coil cracking processes, as at Bayonne, New Jersey, the residue was withdrawn and not returned to the coil inlet, either during the run or in subsequent runs (II, 849). The residue was distilled and only the clean distillate was used in subsequent operations as a charging stock (II, 849-50).

Residue withdrawal and its non-return to the system was not new when Dubbs entered the field. Dubbs could not, and did not, obtain a patent on the step of not recycling the residue as the "vitalizing feature" (Un. Br. pp. 19-22) of its claims. This step was fully taught to the art at least as early as the British Benton patent No. 1922 of 1887 (VII, 3527). It is also disclosed in prior art patents to Pielsticker, Hall, Ellis, Alexander and Greenstreet, hereinafter discussed (*post*, pp. 61-75), and in Manley No. 1,428,338 (VII, 3382, pat. p. 1, lines 40-1) the application for which was filed on October 10, 1917.

In disregard of this prior art, the Royal Dutch Shell and the Standard Oil Company of California recycled residue in their operations. This fact is, undoubtedly, accounted

* The Trumble process recirculated part of the residue, but it was not used commercially as a gasoline making process. It was used as a viscosity breaker, *i. e.*, a process whereby a light crack is given the heavy crude oil so as to thin it out and make it available as fuel oil (I, 532-4). Notwithstanding this now admitted fact, Universal persuaded the Third Circuit Court of Appeals in *Skelly Oil Company* v. *Universal Oil Products Company* (31 F. (2d) 427), that Trumble was a gasoline making process with seventeen day runs on stream.

for by the fact that none of the big oil refining companies paid any attention to what went on in the Patent Office. The Texas Company searched three years for a hot oil pump when the very one which it finally adopted in 1921 had been disclosed in the Thompson patent which issued in 1917. The Standard Oil Company of California did not know of the Dubbs patent in suit until 1924—three years after it had issued—and even then the discovery was accidental.

Hanna, Vice President of that company, discovered the existence of the Dubbs patent in suit only when making a validity search of the prior art as to another later issued Dubbs patent in which he was interested (see Universal's Brief, pp. 34-6). While "cleanliness is next to godliness" may have been a personal revelation to Hanna in 1924, it was an old story in both the patent and commercial art long prior to 1919, and by 1924 "clean circulation" commercial operations had been extensively practiced by The Texas Company at Port Arthur during the three preceding years.

Daniel Pyzel, in charge of development of cracking processes for the Royal Dutch Shell, professed (I, 510) to have been greatly astonished and impressed with the residue withdrawal and non-return feature of the Dubbs operation at Independence. If genuine, this surprise was due to the fact that he had not investigated the patent art and knew nothing of The Texas Company's commercial operations at Bayonne.

Fractionation and Refluxing Were Practiced in Commercial Processes Prior to Dubbs.—Fractionation, or dephlegmation, of the vapors resulting from the cracking reaction, and refluxing the insufficiently cracked portion of the vapors, were commonly practiced in

the commercial field, and were fully disclosed in the patent cracking art long before Dubbs filed his application. Fractionation is a necessary part of any cracking operation because, due to Dalton's law of "partial pressure" (Cady, II, 797-804, Smith, III, 1114), the vapors of the desired product (kerosene or gasoline, as the case may be) always leave the still mixed with vapors of heavier material which must be separated out by cooling and condensing them (Smith, III, 1114). This insufficiently treated condensate is referred to as "reflux," "backtrap," or "runback."

In drum cracking operations such as Burton's, the reflux was continuously condensed in an overhead aerial system, and returned by gravity, and while still hot, to the cracking drum (I, 487); in the commercial continuous coil cracking processes, such as The Texas Company's operation at Bayonne, it was separated out in a dephlegmator and distilled, and the distillate was returned as a charge to the still in a later operation (deFlorez, II, 849-850).

The Two Schools of Cracking: Liquid Phase, and Vapor and Liquid-Vapor Phase.—Before Dubbs entered the field there were two schools of cracking (II, 856), namely, (1) the liquid phase, where, as in the Burton process, a body of liquid oil was cracked and distilled, generally in a tank or drum where it was maintained for a substantial time, and at relatively low temperatures, and under superatmospheric pressure, and (2) the vapor phase, and liquid-vapor phase, where the oil was heated to a high temperature, vaporized—either completely or to a substantial extent—and cracked in a tube or coil with a relatively short time factor.

Oil will crack if subjected to the required temperature and time whether it be in vapor or liquid form, or mixed

vapor and liquid, but there were important reasons in the early days why liquid phase cracking was preferred.

The Early Preference for Gasoline Produced by Liquid Phase Cracking and the Prejudice Against Vapor Phase Cracking.—The first gasoline commercially used was the natural gasoline obtained from crude petroleum by simple distillation, *i. e.*, boiling, without any substantial molecular change. This natural gasoline was water-white in color, easy to treat, and low in "unsaturates" and was then the premium product. When increased demand for gasoline brought cracking processes into commercial use, the attempt was to make a product which most closely resembled this "sweet" natural gasoline. Cracking in the liquid phase, at comparatively low temperatures and with a long time factor, made such a product,* whereas the high temperature, short time factor, vapor phase coil cracking processes made a product which was off color (straw colored), foul smelling, and difficult to treat (II, 856; III, 1229).

The preference of the art in the early days for liquid phase processes, and the prejudice against vapor phase processes, is clearly reflected in the contemporary literature as shown by two articles by Luis deFlorez in *Refiner and Natural Gasoline Manufacturer*, 1923 (DX. 750, II, 857-9), and *National Petroleum News*, 1927 (DX. 751, II, 859-864). This preference is commented on by the Tenth Circuit Court of Appeals in *The Texas Company* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829 (at p. 834).

* The specification of Burton's patent No. 1,049,667 reflects his desire to produce a product of the paraffin and not of the ethylene series, thus to avoid the "offensive odor" of the latter. (See Reiman, III, 1191.)

The Function and Use of Superatmospheric Pressure in Cracking Processes Was Also Well Understood and Practiced Long Before Dubbs's Entry Into the Field—In liquid phase drum cracking processes, such as Burton's, pressure* was used to raise the boiling point of the oil and to keep it liquid at a cracking temperature for a sufficient time for the molecular decomposition, or cracking, of the liquid body of oil to take place (III, 1061). When cracking oil in a drum or tank, provided (as it must be) with a vapor outlet at the top, unless the boiling point of the oil is raised by maintaining superatmospheric pressure on the oil in the drum, too much of the oil would vaporize and leave through the outlet as vapor before it would reach a cracking temperature. By maintaining pressure in the drum, the boiling point of the oil is raised above the cracking temperature, the oil is kept in the liquid state for a sufficient period of time to be cracked, and vaporization of the oil will not occur until the chemical decomposition, or cracking, has resulted in the formation of lighter products, such as gasoline or kerosene, which will vaporize at the drum temperature in spite of the drum pressure.

This is well expressed in a Bulletin put out by petitioner in 1936 (DX. 819, VI, 2993), wherein petitioner stated that cracking (obviously meaning in its own process)

> "* * * is distillation under high pressure. In the cracking process the oil which has been stripped of all its gasoline is heated above its boiling point, but

* The function of pressure in cracking processes is nowhere explained in petitioner's Brief. The statement in this Court's opinion in *Standard Oil Co.* v. *United States*, 283 U. S. 163, quoted on page 9 of petitioner's Brief, to the effect that "heat and pressure" produce cracking, was true of the pressure distillation systems then under consideration by this Court; it is not true of a coil cracking operation such as respondent's.

the pressure chokes back boiling or vaporization until a chemical riot completely changes its nature. The big molecules which make up the oil are shattered—'cracked' into small ones which make up anti-knock gasoline."

In *coil* cracking vapor phase and liquid-vapor phase operations, the cracking operation itself is in no way dependent upon pressure, because the vapors cannot escape from a coil but must travel throughout its length, and being thus subjected to the same high temperature for the short time necessary to pass through the coil, will be cracked together with the liquid. In such processes, pressure is used merely to economize on the length of coil by compressing the vapors into a smaller space (Smith, III, 1062).

The Third Circuit District Court said, in the *Root* case (6 F. Supp. 763, at p. 764) that cracking is the decomposition of petroleum "by heat and pressure." This is admittedly wrong, for oil will crack regardless of pressure. The essential factors are heat and *time*.

THE DUBBS PATENT; ITS OBJECTS AND THE NATURE OF ITS PROCESS.

The Objects of the Dubbs Patent as Stated in the Specification.—Dubbs summarizes the nature of his process by stating the "salient objects" of his invention. Among these he enumerates (pat. p. 1, lines 13-42, VII, 3089) feeding the oil continuously through the "cracking zone" and continuously removing "carbon containing residue" from "the cracking zone." These objects define Dubbs's "cracking zone" as the B tubes together with the C tubes. Another object is to provide a process where the reflux condensate is returned to the cracking zone "for further treat-

ment substantially free from carbon," this being what petitioner calls the "clean circulation" step.

The object which specifies Dubbs's solution of the carbon problem is as follows:

> "• • • to provide a process which permits of the apparatus being operated for an extended period without the necessity of cleaning **and in which that part of the system containing the precipitated carbon, is free from subjection to any excessive heat;** • • •"

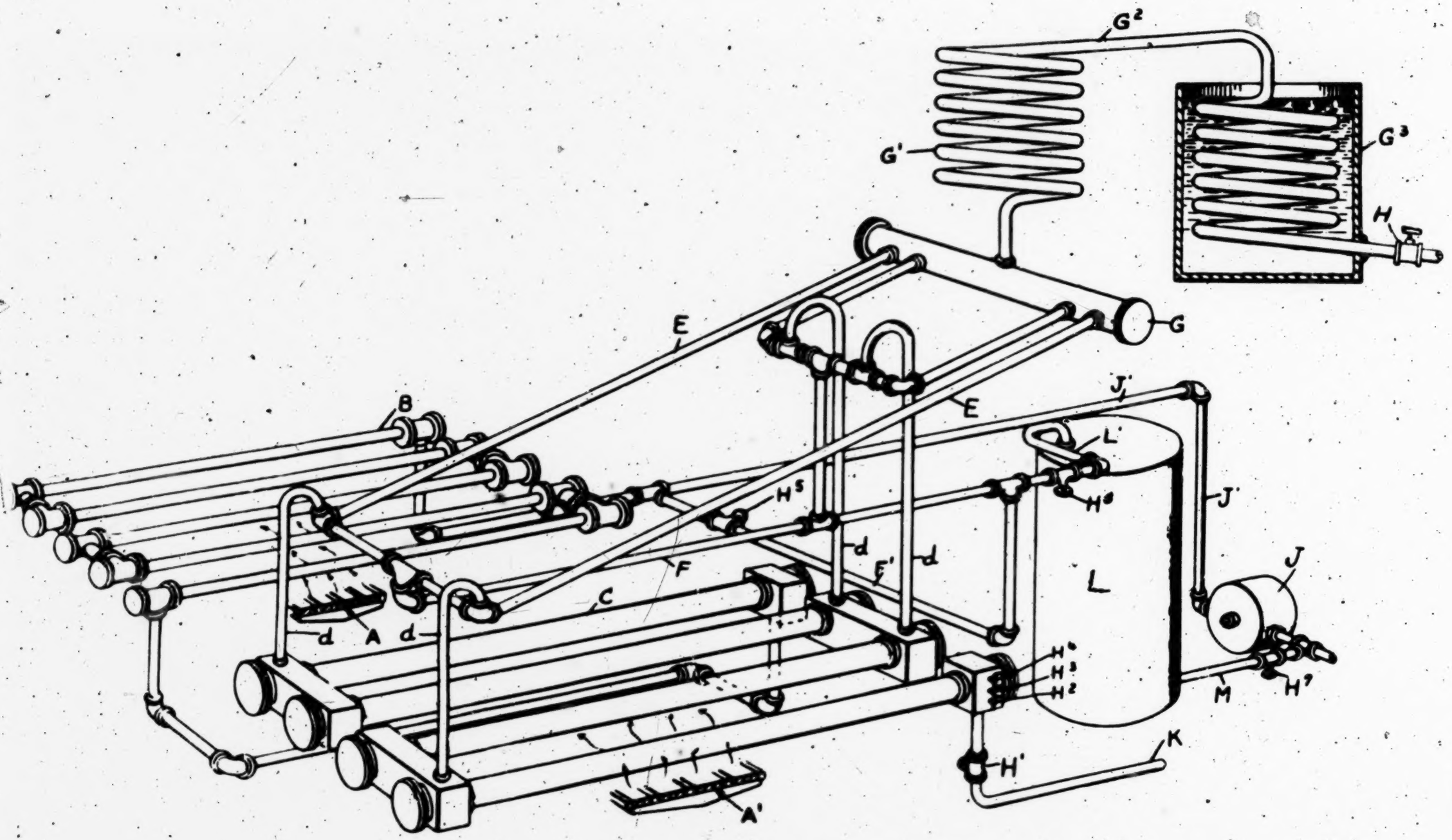
The part of the system which is "free from subjection to any excessive heat" is, of course, the insulated or lightly fired C tubes in which carbon, formed as the result of cracking therein is "precipitated," without harm or danger.

The Dubbs Patent Teaches and Claims a Liquid Phase Two-Step Cracking Process.—Opposite this page we reproduce Defendant's Exhibit 773 (VI, 2805), which is a simplified isometric drawing of the Dubbs patent.* The Dubbs patent, in common with many other patents dealing with the processes of cracking petroleum, is directed to a solution of the carbon problem. The specification teaches an operation where the oil is raised to a cracking temperature in the B tubes, where cracking is initiated, and is then transferred to the larger C tubes, which are either insulated or lightly fired for the purpose of maintaining the temperature of the oil and *allowing it sufficient time in which to crack* (Smith, III, 1073-5).

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* Petitioner's drawing (Plate III, Supplement) omits the supply tank L described in Dubbs's specification and disclosed in his drawing. This supply tank is provided as an alternate method for returning reflux to the B tubes. In this tank, the reflux is mixed with the fresh charge and the mixture is pumped to the inlet of these tubes. Petitioner's drawing also omits the furnace which Dubbs shows under the C tubes, whereby, in accordance with Dubbs's specification (pat. p. 1, line 99, VII, 3089), these tubes may be mildly heated.

BS PATENT NO. 1,392,629 - SERIAL NO. 283,673
led MARCH 19, 1919 - Issued OCTOBER 4, 1921



The fact that the cracking operation is substantially confined to the insulated or lightly fired C tubes, through which the cracking heat is not imparted to the oil, makes it possible in the process to deposit carbon in these tubes without danger. This was Dubbs's departure from the prior art practice of heating and cracking in the same part of the apparatus. In commercial operations of "The Dubbs Process," a large, unheated reaction chamber (40 feet high and 10 feet in diameter), or a plurality of such chambers, was substituted for the C tubes, and the end of the run was reached when these chambers became filled with coke or carbon (II, 609-10).

Respondent's witness, Howard V. Smith, aptly compared this method of imparting cracking heat in one step and maintaining it to cause cracking in a second step, to the "fireless cooker" principle (III, 1074). The mild heat supplied to Dubbs's C tubes is the equivalent of the hot plates used to maintain the temperature in a "fireless cooker."

While the specification of the Dubbs patent does not state in so many words where cracking occurs in his system, nevertheless to a man skilled in the art as of the time that Dubbs entered the field, who was fully familiar, as we have shown, with the effect of temperature and time in cracking, with the use and effect of superatmospheric pressure in oil cracking processes, and with the causes of vaporization therein, the teaching is explicit enough (Smith, III, 1080-4).

The B and C tubes are in open communication, and are, therefore, maintained under the same pressure which is stated to be (pat. p. 2, lines 55-6, VII, 30) "approximately 100 lbs. to the square inch." In the B tubes, the cracking

heat is imparted. The patent says (p. 1, line 75, VII, 3089) that

> "• • • during the time they [the hydrocarbons] are passing through said tubes [B tubes], they are subjected to sufficient heat to cause the desired amount of cracking • • •"

and that (p. 1, line 108):

> "• • • The per cent. of vapors generated from the oil as it passes through the tubes C will depend on the amount of heat acquired by said oil while passing through the 4" coils."

The District Court carefully pointed out (VI, 3048) that the first-quoted passage "does not say the desired amount of cracking occurs in the B tubes" and concluded that "from the whole patent it is clear that what he [Dubbs] is attempting is to impart to the oil in the B tubes the heat that will cause it to crack in the C tubes."

In the second passage above quoted, "vapors generated from the oil" in the large, ten-inch C tubes result entirely from the cracking operation carried on therein (Smith, III, 1080). The "per cent" referred to in the clause "The per cent. of vapors generated from the oil as it passes through the tubes C" etc., is plainly the ratio of the vapors generated in the C tubes to the unvaporized oil in those tubes.

The reason that vaporization in the C tubes results wholly from cracking is as follows: Vaporization of a liquid* results from (1) an increase in temperature, (2) a decrease in pressure, or (3) a change in the molecular composition of the liquid whereby lighter materials are formed or added,—and, of course, from a combination of any, or all, of these three factors (III, 1081). In the Dubbs patent (1)

* Solids also vaporize (*e. g.*, camphor), but with this phenomenon, called "sublimation," the oil cracking art is not concerned.

the oil is at its highest temperature at the exit from the B tubes and upon its entrance into the C tubes; (2) there is no reduction of pressure in the C tubes over that which obtains in the B tubes; (3) no heat for the purpose of raising the temperature of the oil in the C tubes is imparted to these tubes. Therefore, eliminating decrease in pressure or increase in temperature as the cause of the "vaporization" or "vapors generated" in the C tubes, it necessarily follows that this vaporization must be due entirely to the only remaining possible cause, *viz.*, the formation, as the result of cracking, of lower boiling materials, which, at the temperature maintained in the C tubes, will vaporize in spite of the pressure obtaining therein (III, 1081). To the man skilled in the art, this is a clear teaching of cracking in the C tubes (Smith III, 1083-4).

All conditions necessary to cracking are maintained in the C tubes. They are larger in diameter than the B tubes and, therefore, although only half full, hold more oil. Dubbs's patent drawing indicates that the C tubes have six times the volumetric capacity of the B tubes which in itself teaches that the oil is to remain in the C tubes a much longer time than in the B tubes. If the C tubes were intended, as petitioner suggests (Br. pp. 79-80), merely to effect "separation" of liquid from vapor, one tube only, instead of the four shown in the patent, would, on petitioner's expert's admission (II, 750-1), be sufficient for this purpose. In the larger C tubes the velocity of the stream is necessarily slower than in the smaller B tubes, thereby permitting the oil to remain in the C tubes for a sufficient time to be cracked (III, 1092). As the oil is at a cracking temperature from the time it enters the C tubes until the time it leaves, cracking occurs throughout their length (Smith, III, 1092-3; Brown, II, 750-1). On the other hand,

in the B tubes the oil reaches its highest temperature only at their outlet.

The patent specification is wholly silent as to the physical state of the oil in the B tubes. Whether or not vapors are present as "foam" or in any other form is not stated, but the contrary is implied, for the stream in those tubes is referred to as oil, and oil is normally a liquid. Universal's description (Br. p. 18 and elsewhere) of vapors generated but not separated in the B tubes is not taken from the patent.

The patent does not mention what per cent of the cracking may occur in the B tubes, but the limitation in the claims, requiring that the oil in these tubes be raised to a cracking temperature but without "substantial vaporization," puts a limit upon the cracking which may occur therein, even though the pressure should be considerably increased above the "approximately 100 lbs. to the square inch" given in the specification. Of the relative proportion of cracking in the B and C tubes, and of the necessity for cracking in the C tubes to cause vaporization, H. V. Smith testified as follows (III, 1091-2):

> "A. Taking the pressure given in the illustrative run of approximately 100 pounds, very little of the cracking could take place in the B tubes without bringing about substantial vaporization, so that under those conditions substantially all of the cracking would have to take place in the C tubes.
>
> "By the use of higher pressure, however, one could increase the proportion of cracking which would take place in the B tubes. But in any event a very substantial proportion of the cracking must take place in the C tubes because this cycle of vaporization, reflux condensation, and reflux return, which is an important part of this patent, requires that vapors be formed, that is that we must have vaporization in order to

make the vapors for completing the cycle, and since that vaporization is reserved to the C tubes we must have enough cracking in the C tubes to accomplish the vaporization for carrying on the process. Therefore, in any event we must have a large part of the cracking taking place in the C tubes.

"You could not within the Dubbs patent specification, as I have interpreted it, do substantially all the cracking in the B tubes and substantially none in the C tubes, without departing from the principles of the Dubbs invention for the reason that I just stated."

Whatever cracking occurs in the B tubes is substantially in the liquid phase (Smith, III, 1091), and the cracking which occurs in the C tubes is likewise in the liquid phase because the vapors resulting from cracking leave these tubes through the vapor pipes D substantially as soon as they are formed and are not subjected to the cracking temperature for a sufficient time to be cracked (Smith, III, 1091).

Petitioner has always contended, and the Third Circuit courts held, that the words "B are the cracking tubes" occurring in the Dubbs patent (p. 1, line 52) indicate that the major part of the cracking occurs in these tubes, and hence that substantial "generation of vapors" occurs therein. The Seventh Circuit courts were not misled by petitioner's construction of this nomenclature.

Respondent's expert witness, H. V. Smith, pointed out, on direct examination, that (III, 1099):

"• • • B are the cracking tubes because in B the cracking heat is imparted to the oil and the cracking is initiated. That is what he [Dubbs] means by 'B are the cracking tubes.'"

And on cross-examination he said (III, 1163):

"A. I think a man skilled in the art, reading this patent, would understand that use of the name 'crack-

ing tubes' to mean just what I have explained it to mean, namely, the tubes in which the cracking heat is applied to the oil and the cracking is initiated, because he would read the patent as a whole."

From this testimony it is clear that petitioner is in error in stating (footnote Br., p. 74) that respondent argues that the designation of the B tubes as "cracking tubes" is a "misnomer." However, that Dubbs intended no especial significance by this designation is apparent from the fact that his specification also twice refers to the B tubes as "heating tubes" (pat. p. 1, line 93; p. 2, line 7, VII, 3089-90). In Dubbs's other numerous references to these tubes, he merely calls them "tubes" or "coils."

The Dubbs principle of two-step, or "fireless cooker", cracking made it possible, in commercial operations, to charge to the system even the dirtiest stocks, such as crude petroleum or residuum from a prior cracking operation, and to continue to run until the reaction chamber, or chambers, became filled with carbon. This ability to handle any kind of stock, and the solution of the carbon problem by causing the carbon to be deposited in an unheated or lightly fired part of the system, caused the "Dubbs Process" to go into extensive commercial use. For this contribution, Dubbs and Universal have been amply rewarded.

Universal's advertising (DXs. 590-2, V, 2393-6; 2401-3) shows that it was the ability of the "Dubbs Process" to handle any stock that was regarded as the one thing worth stressing as its advantage over all others. Petitioner's witness Huff testified (II, 623) that Universal considered this as "a real advantage, and we so told the licensees." Pyzel, of the Royal Dutch Shell, a Dubbs licensee, testified (I, 544-5) that when he took his license he did not know of any

other process "in which fuel oil could be fed directly to the heating tubes and make commercial yields of gasoline," and that this feature "was an important consideration in the negotiations which led to our taking of a Dubbs license."

In the Dubbs Patent "Clean Circulation" Is Not the Solution of the Carbon Problem, But Is a Minor Step in Furtherance of the Two-Step Cracking Process Which Did Solve That Problem.—Petitioner erroneously attributes the solution of the carbon problem in the process of the Dubbs patent to what it calls "clean circulation," which it defines as (a) the withdrawal and non-return of cracked residue, and (b) the return of the reflux from the aerial condenser G' either to the supply tank L or to the inlet of the B tubes. This definition is not sound. Petitioner's expert admitted (II, 708-9) that "clean circulation" is merely the return of reflux to a coil inlet (B tubes), instead of directly to the cracking vessel (C tubes).

(a) The residue withdrawal step in a continuous process was unquestionably not new with Dubbs, but was practiced and taught in all prior art continuous coil cracking operations (deFlorez operations of The Texas Company at Bayonne, II, 846-56) and prior art patents (*post*, pp. 61-77), and in continuous drum cracking processes (Manley patent 1,428,338, VII, 3382, application filed October 10, 1917). This step of withdrawing and not returning residue formed in the cracking operation functions no differently regardless of whether reflux be returned to the cracking vessel, as in Manley 1,428,338 (VII, 3382), to the coil inlet, as in Dubbs, Behimer, Pielsticker, and others (*post*, pp. 61-77), or not returned at all during the run, as at Bayonne, New Jersey. In the prosecution of Dubbs's application, he repeatedly tried to get claims with residue withdrawal and its non-return as their distinguishing feature, and the Patent

Office consistently refused him a patent on this concept (IV, 1526-7, 1535).

(b) Whether reflux be returned directly to the supply tank, or to the inlet of the B tubes ("clean circulation"),* rather than directly to the C tubes or cracking vessel (as in the prior commercial art—*not* "clean circulation"), has practically no effect on the carbon problem. In either case, the reflux eventually enters the C tubes, or their equivalent, and is commingled with the carbon-laden residual oil therein.

With respect to the feature of reflux return to the coil inlet, or to the supply tank L, Dubbs's specification says (pat. p. 2, line 28):

> "• • • the reflux condensate in all cases is trapped off from the vapor lines in such manner as to prevent their [sic] returning direct to the vaporizing tubes C."

No reason is given in the patent for this explicit instruction, but it is obvious that, because the reflux is cooled when condensed in the dephlegmator, were it returned directly to the C tubes, it would lower the temperature of the oil therein, and would thus tend to defeat Dubbs's teaching that cracking conditions must be maintained in the C tubes (Smith, III, 1090). Dubbs teaches that the reflux, like the charging stock, is to be raised to a cracking temperature before entering the C tubes, and this can only be accomplished by passing it through the B tubes. Therefore, the step of reflux return to the inlet of the B tubes, or to the supply tank, is in furtherance of Dubbs's basic

* This step, in combination with the residue withdrawal step, was also old in the patent art hereinafter discussed (*post*, pp. 61-77). It was not practiced commercially prior to Dubbs's filing date.

teaching of heating *all* the charge material—both fresh charge and reflux—to a cracking temperature in the B tubes, where cracking is initiated, and causing this temperature to act for a period of time to crack the liquid body of oil in the C tubes thereby solving the carbon problem by causing the carbon to be deposited in a safe place.

This Record Shows Conclusively That Commercial Cracking Stills Functioned Practically as Well Without, as With "Clean Circulation".—In 1920, The Texas Company installed and operated twenty-four batteries of commercial Holmes-Manley stills at Port Arthur, Texas. In these continuous operations (II, 929-930; see also DX. 729, VI, 2721), the fresh charging stock was heated to a cracking temperature in coils, and was thence conducted to lightly fired drums where the temperature was maintained and sufficient time was allowed for the oil to be cracked and for the carbon to be deposited. Fresh feed was continuously pumped to the coils, and residue was continuously withdrawn from the cracking drums during the run and was not returned to the system. In these respects, the process was similar to the B-tube-heating and C-tube-cracking with continuous residue withdrawal of the Dubbs patent.

However, in these Texas operations, the reflux was returned from the dephlegmators *directly to the cracking stills and not to the coil inlet*, as in Dubbs. Hence, they did not embody the principle of "clean circulation." *Nevertheless, these operations were very successful and the stills were profitable and paid out rapidly* (Holmes, II, 968-9): Due to the cooling effect of the reflux, the drums would, of course, have to be fired a little harder (III, 1090) than when, as in subsequent operations, beginning in 1921 (II, 930), the reflux was returned to the coil inlet ("clean circulation").

Otherwise, there was no difference (II, 931). The carbon problem was solved in the same way in both operations, namely, by imparting the cracking heat to the oil in the coil, and conducting the cracking operation itself, with the resultant deposit of carbon, in the lightly fired drums or stills. This, and not reflux return to the coil inlet, or to a supply tank ("clean circulation"), is likewise the solution of the carbon problem in Dubbs. It is a solution which the respondent does not use.

The Claim Limitation Requiring That the Heating Step Be Accomplished "Without Substantial Vaporization" of the Oil in the Coil.—The District Court and the Court of Appeals held (VI, 3051, VII, 3581) that the claims in suit of the Dubbs patent, being limited by the requirement that the preliminary step of heating the oil in the coil or B tubes, be carried out "without substantial vaporization," are not infringed by the respondent's process, in which the heating and cracking step in the coil, *is* accompanied by "substantial vaporization." It is stipulated between the parties (I, 475) that 85% by weight, and 95% by volume, of the oil in respondent's coil is therein converted into vapor. The District Court and the Court of Appeals held that "vaporization" in the limiting clause of the claims of the Dubbs patent means, as it has always meant, the conversion of liquid into vapor, *i. e.*, the generation of vapor from liquid. If this be so, it is conceded that respondent does not infringe the claims of the Dubbs patent.

Petitioner's expert contended that "vaporization" in the Dubbs patent means the "liberation or freeing of bubbles of vapor entrained in a liquid phase, so that these bubbles may coalesce to form a continuous vapor phase" (III, 1363-4).

The Meaning of the Word "Vaporization".—"Vaporization" is a word of common use in physics and chemistry, and in the oil cracking art. It means the change of state from liquid to vapor; that is, the generation or formation of vapors from liquid. It has no other meaning.

For the convenience of the Court, we set forth in an Appendix the definition of "vaporization" as contained in dictionaries and textbooks.

The heat consumed in the change of state from liquid to vapor is called the "heat of vaporization" or the "latent heat of vaporization" (III, 1065). Implicit in this well-known physical principle is the definition of "vaporization," for heat is consumed only in vapor "generation," and not in vapor "liberation."

Where vaporization is caused by reduction in pressure, without imparting heat, the heat for vaporization is supplied by a reduction in temperature of the liquid undergoing vaporization.

Dr. Hamilton P. Cady,* Professor of Chemistry, and Chairman of the Department of Chemistry at Kansas University (II, 791), Howard V. Smith, Chief Chemical Engineer for the Barber Asphalt Corporation (III, 1065), Dr. C. K. Reiman, consulting engineer (Sc. B. Mass. Institute of Technology, D. Sc. University of Geneva), with wide experience in petroleum research and refinery practice (III, 1288-9), Luis deFlorez an outstanding inventor, who was for many years consulting engineer in the oil refining industry (II, 854),—all testified that "vaporization" means the change of state from liquid to vapor, *i. e.*, the generation of vapor.

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* Dr. Cady fully explained the physical laws of vaporization (II, 788-809).

Richard J. Dearborn, patent counsel for The Texas Company, who is representative of the profession especially trained in the reading and interpretation of patents, and who was also thoroughly familiar with the oil cracking art, understood the word "vaporization," occurring in the limiting clause of Dubbs's claims, in its true sense of denoting the formation of vapors (I, 229). He testified (I, 229) that in entering a disclaimer of the counts of the Interference No. 49,355 (which were the claims, save claim 6, of the Dubbs patent in suit) he understood the phrase "without substantial vaporization" to limit the Dubbs claims to a liquid phase process in which The Texas Company was not interested because in its Behimer commercial process, there was vaporization "in the ordinary sense of the production of vapors" in the coil.

Of the many witnesses who were called at the trial, the only one who claimed that "vaporization" had other meanings than its accepted one was petitioner's expert, Dr. George Granger Brown, who said that the word could also mean "generation" of vapors when accompanied by "liberation," or "liberation" alone. Brown was unable to show that anyone else ever gave his special meanings to "vaporization," and he admitted that the word was ordinarily used to denote the change of state from liquid to vapor (II, 702). Nevertheless, he asserted that in the Dubbs patent the accepted meaning of "vaporization" was "specifically excluded" (II, 708).

The prior patent art in the case at bar definitely shows that "vaporization" was always used in oil cracking or treating patents in its accepted meaning to denote the formation of vapors. Dubbs, himself, in another patent, No. 1,686,654, as well as in the patent in suit, thus used the

word, as shown by the fact that claim 4 of this other patent calls for heating the oil in the coil "under sufficient pressure to prevent the vaporization of any substantial portion" thereof (claim 4, VII, 3474).

The Egloff patent in suit, whose application was prosecuted by the same solicitor who prosecuted the Dubbs application, uses "vaporization" in its accepted sense, for claims 3, 4, and 5 call for delivering the oil to an "enlarged" zone at a "sufficiently high" temperature to cause "a substantial vaporization" of the oil "in said zone" (VII, 3096).

In the quoted passages from these patents, petitioner's alleged special meaning for "vaporization" is excluded because heat and pressure have effect only on the generation of vapors. They have no effect whatsoever on their "separation" or "liberation" from a liquid surface (Smith, III, 1065, 1097).

Petitioner Has Not Shown Any Use in the Art or Otherwise of Its Alleged Special Meaning for "Vaporization." —The record does not show a single instance of any use of "vaporization" in petitioner's special sense either in its own patents, or in any other patent, or in any scientific or technical book or magazine, or in any other writing whatsoever. Petitioner attempts to assert (Br. "Appendix") that definitions of "vaporization" which describe it as the "passing off" of vapor support a different concept. Obviously in petitioner's definitions the "passing off" is the change of state itself. Vapor molecules as they form and assume their distinct physical characteristics as vapor inevitably "pass off" or become liberated or separated from the mother liquid and this is so whether they "pass off" into bubbles in the body of the liquid, or "pass off" at its surface..

Daniel Pyzel, in charge of the refinery operations for the Royal Dutch Shell, a principal shareholder and licensee of Universal, took out many patents, four of which are in evidence.* In each of these, as he himself admitted (Pyzel, I, 547-550), he used "vaporization" in its accepted sense to denote vapor formation or generation, *i. e.*, the change of state from liquid to vapor (see, also, Reiman, III, 1289-1291).

Richard W. Hanna, Vice-President of the Standard Oil Company of California, the other principal shareholder and licensee of Universal, also took out patents, three of which are in evidence.† In each of these he used "vaporization" in its true sense (Reiman, III, 1292-3).

The trial court excluded, erroneously, we submit, (a) Pyzel's admissions that in the patents referred to he used "vaporization" to denote "generation of vapors," and (b) Dr. Reiman's testimony regarding the use of the word in both the Pyzel and Hanna patents. Accordingly, this testimony is in the record under Rule 43 (c) of the Rules of Civil Procedure.

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* Pyzel patents in evidence are 1,506,444 (VII, 3425), 1,597,821 (VII, 3436), 1,622,737 (VII, 3444), and 1,891,218 (VII, 3506).

† Hanna patents in evidence are 1,449,226 (VII, 3394), 1,449,227 (VII, 3402), and 1,655,603 (VII, 3462). When, on the taking of Hanna's deposition, he was asked on cross-examination to state the sense in which he used "vaporization" in his patents, petitioner's counsel, William F. Hall, instructed the witness not to answer, and he did not answer (II, 583-91). Universal's counsel evidently feared what his answer would be. Although Universal succeeded in getting its objection sustained to respondent's offer of the meaning of "vaporization" in the patent art (III, 1289), it now relies (mistakenly) on a passage in the Behimer patent (Br., p. 101) to sustain its meaning for the word. Hence, it has plainly waived its prior objection.

Petitioner asserts (Br. pp. 100-1) that claim 30 of Behimer patent 1,883,850 (VII, 3494-5) uses "vaporization" to denote "liberation" of vapors in the phrase "separating the lighter constituents by vaporization from the residual oil * * *." Obviously "vaporization" here has its only and natural meaning. Separating by vaporization means to separate by converting liquid into vapor.

Dr. Brown's testimony on the alleged use of "vaporization" to denote "passing off" of vapors in the Gyro process, on which petitioner relies, is entitled to no weight, for upon being asked (II, 757) to produce any published description of this process where the word was so used, he was unable to do so, although he admitted that the process had been described quite frequently. Furthermore, the very passage of Brown's testimony which petitioner quotes (Appendix, p. ii) shows that in the "vaporizing tubes" of the Gyro process liquid was converted into vapor.

Dubbs's Specification Gives No Special Definition for "Vaporization"; It Does Not Use "Vaporization" and "Liberation" as Synonyms.—The word "vaporization" is not defined at all in the Dubbs patent in suit (PX. 502, VII, 3086) any more than are other terms commonly used in the art, such as "cracking," "carbon," "reflux condensate," etc. The Dubbs patent contains no definitions of words or phrases. It uses words in their accepted sense.

The word "vaporization" occurs only once in Dubbs's specification, in a sentence which describes what occurs in the 10-inch C tubes (pat. p. 2, line 40):

> "* * * The heated oil then passes to the 10 inch coils C which are maintained about half full of oil and wherein vaporization takes place."

This "vaporization" in the C tubes is also described in

the patent as the generation of vapors. Thus, the specification says (pat. p. 1, lines 108-112):

> "* * * The per cent. of vapors generated from the oil as it passes through the tubes C will depend on the amount of heat acquired by said oil while passing through the 4" coils" [B tubes].

"Separation" or "liberation" of vapors from the liquid body of oil is also described as occurring in the C tubes, but Dubbs does not describe this action as "vaporization"; he calls it "liberation." The patent says (p. 1, lines 78-82):

> "* * * Said oil is then passed into the tubes C which are only partially filled with the oil and as the oil passes through these tubes, there is a liberation of vapors from same * * *."

Dubbs's *specification* does not mention the presence or absence of vapors in the 4-inch B tubes. The contents of these tubes are described as "oil" (pat. p. 1, lines 78 and 111; p. 2, line 41). The *claims* state that there shall be no "substantial vaporization" of this "oil" in the B tubes. Both the claims and the specification state that there is "vaporization" of the oil in the C tubes. As Dubbs's specification expressly describes the "generation" of vapors in the C tubes, the word "vaporization" in the claims and in the specification denotes "generation" which is the accepted meaning of the word. Thus, petitioner's contention that, in the patent, "vaporization" is a synonym for "vapor liberation," is refuted by the document itself.

The Dubbs Patent Teaches Means for Preventing Substantial Vaporization in the B Tubes; It Teaches No Means for Preventing "Liberation" of Vapor from Liquid in These Tubes.—The means for preventing substantial vaporization, in the accepted sense of preventing substantial vapor formation in the B tubes, is clearly taught in the

Dubbs patent. This means is the use of superatmospheric pressure (Smith, III, 1086) which the patent gives in the example as "approximately 100 lbs. to the square inch" (pat. p. 2, line 56).

At the time the application was filed, the art well understood the use of superatmospheric pressure to prevent or retard vaporization.

If, however, the words "without substantial vaporization" in the limiting clause of the claims be given petitioner's meaning to indicate "without permitting a condition of substantial separation of liquid from vapor," there is then no teaching whatsoever in the patent of means to achieve this result. The only way to prevent the "separation" of liquid from vapors in a 4-inch coil would be to use a sufficient velocity to maintain the stream of oil and vapors intimately mixed together in a turbulent flow (Smith, III, 1097-8), but there is not a word in the Dubbs patent, from beginning to end, concerning velocity. The word "velocity" is not mentioned, nor is there any passage from which any teaching of velocity or turbulent flow can be inferred. Petitioner's expert also asserted (II, 721) that the limiting clause permits a "foam" but prohibits a "spray." The Dubbs patent does not even mention a "foam" or "spray," and so, of course, does not instruct how to avoid the transition from "foam" to "spray."

The Word "Substantial" in Dubbs's Claims Denotes the Meaning of "Vaporization" as Formation, and Not Separation, of Vapors From Liquid.—Dubbs's claims do not prohibit all vaporization in the heating step. They contemplate that in raising the oil to a cracking temperature in the B tubes, there may be some insubstantial vaporization.

If, however, "vaporization" means separation of liquid from vapors, the qualifying adjective "substantial" is meaningless. Vapors "separate" from liquid because they are lighter than the liquid (III, 1097). There can be no such thing as a "substantial" number of bubbles remaining unliberated while an "insubstantial" number obey gravity and pass on up and out of the liquid (III, 1095-6).

The qualifying adjective "substantial," occurring in the limiting clause of all Dubbs's claims in suit, is completely ignored in petitioner's Brief.

Dubbs's Specification Discloses a Range of Operating Conditions Within Which the Process of the Claims May Be Practiced.—What petitioner calls Dubbs's "illustrative run" was added in September, 1919, in the first amendment (IV, 1520-1), at a time considerably before the claims were limited (Paper No. 8, April 13, 1921, IV, 1536-40) to a process where the oil is heated to a cracking temperature but "without substantial vaporization."

This "illustrative run" gives a temperature range of 750° to 860° and a pressure maintained throughout the B and C tubes of "*approximately* 100 lbs."

By staying within the lower part of this range, *i. e.*, about 750° F., and even without exceeding the *approximate* 100 lbs. pressure, there would be no substantial vaporization of the oil in the B tubes, but in this case it would be necessary to supply mild heat to the C tubes in order to maintain the oil therein at a cracking temperature (Smith, III, 1088). This is because heat is lost in the C tubes due to cracking, vaporization, and radiation. Therefore, when the oil leaves the B tubes at 750°, which is a low cracking temperature, it must be maintained at this temperature in the C tubes, by mildly heating them (as the patent ex-

pressly permits, p. 1, line 99, VII, 3089), or the oil would be insufficiently cracked therein.

Petitioner asserts (Br. p. 75) that the "mild" heating of the C tubes must be so regulated as to supply heat lost from radiation only, carefully avoiding the supplying of heat lost, also by vaporization and cracking. The patent says nothing about such absurd distinctions. Daniel Pyzel of the Royal Dutch Shell, a Universal licensee, said (I, 518) that the purpose of heating the C tubes in the Dubbs operation which he witnessed in 1919 was to keep the temperature of the oil in the C tubes the same as it was at the outlet of the B tubes, and to supply to the oil in the C tubes, heat lost from vaporization and cracking, as well as from radiation.

Even at the top temperature of Dubbs's "example" namely 860°, in the B tubes, substantial vaporization of the oil therein could be prevented were the pressure correspondingly increased, especially if a higher pressure were maintained in the B, than in the C, tubes (Smith, III, 1133). That this pressure differential is, in petitioner's view, within the scope of the Dubbs patent is shown by the fact that in respondent's process, said to infringe that patent, pressure is reduced from 500 lbs. in the coil to 26 lbs. in the vapor separator. Petitioner contends that the vapor separator is the equivalent of Dubbs's C tubes.

The Dubbs patent gives 100 lbs. to the square inch as "approximately" the pressure to be maintained. Increasing this pressure sufficiently to prevent "substantial vaporization" of the oil in the B tubes at the higher temperatures given in Dubbs's patent was well within the skill of the art when Dubbs filed his application (III, 1090-1). Petitioner does not deny this.

Dubbs Amended His Claims by the Limitation to "Without Substantial Vaporization" in Order to Distinguish His Process From the Prior Art on Which His Prior Claims Had Been Rejected.—Dubbs filed his application on March 19, 1919, with three original claims. The third claim was incomplete and may be disregarded. Claims 1 and 2 (PX. 501, IV, 1515-16) called for first and second steps in identical language as follows:

> "A process of converting heavy into lighter hydrocarbons, consisting in passing the oil through a heating coil in a cracking zone, passing the oil and generated vapors into a vapor chamber, * * *" etc.

This language indicates the presence of "generated vapors" in the B tubes but does not say whether the amount of generation is large or small. These original claims were rejected and cancelled (IV, 1519, 1521) and no one of the claims thereafter asserted during the prosecution of the application made any mention of the presence or absence of vaporization ("generated vapors") in the B tubes, until the claims submitted in the final amendment, wherein, for the first time, appeared the limitation against "substantial vaporization." Hence, the "vaporization" of the allowed claims is the same as the "generated" vapors of the original claims, but in the allowed claims the permitted generation of vapors is limited to an insubstantial amount.

Up to the final rejection, Dubbs was insisting that his process distinguished from the prior art cited against him, on the ground that in his process all the residue was withdrawn and not returned to the system, whereas in the prior art references all or part of the residue was recirculated (IV, 1533). The Patent Office refused to recognize the asserted distinction and repeatedly rejected the claims (IV, 1535). *Dubbs never got a patent with residue withdrawal as the carrying element of the claims.*

Just prior to the final amendment, wherein the claims were limited to "without substantial vaporization" in the heating step, Dubbs stood rejected, *inter alia*, on the prior art patents to Edwards, No. 1,170,884, Smith, 1,239,423, and Trumble (British) No. 15,084 of 1915 (PX. 501, Paper No. 4 and Paper No. 6, IV, 1526, 1535).

The British Trumble patent discloses a cyclic process where the oil is heated in a coil so that vaporization occurs therein, resulting in a "foamy mixture" of mixed oil and vapors. Trumble's specification describes (DX. 813, p. 2, lines 16-17, VII, 3558) the contents of the coil as "forming a foam."* This stream of foam, comprising mixed liquid and vapors, then passes to a vapor releaser, from the top of which vapors pass to a dephlegmator, and from the bottom of which residual oil is drawn off to a settling tank. The vapors from the top of the dephlegmator are taken off and condensed as the final product. Vapors are also condensed in the dephlegmator, and this condensate is drawn off from the bottom thereof and conveyed to the settling tank where it mixes with the residue from the bottom of the vapor releaser. From the bottom of the settling tank, a portion of the carbon-containing residue is drawn off to storage. The balance of the residue, mixed with the clean condensate from the dephlegmator and additional fresh stock, is returned to the coil.

The Edwards patent (DX. 785, VII, 3182) discloses a drum set above sloping tubes located in a furnace. Vapors are taken off from the drum to partial condensers from

* Other instances of the presence of mixed oil and vapors in the coil of the Trumble British patent (VII, 3557) are as follows: p. 2, line 23, "foamy mixture"; p. 5, line 48, "moving mass of oil which assumes a foamy nature. This foam" etc.; p. 6, lines 47-50, "oil can be changed into a foam • • • the foam so produced."

which the desired product is led off to a final condenser. The reflux is conducted back to a drum located below the tubes. From the far end of the upper drum, the residue is withdrawn. The oil in the tubes and drum circulates by thermosyphon action. Vapors are formed in the coils as appears from the following passage in the patent specification (p. 2, line 56):

> "• • • The still is thus divided into a number of small circulating units, bringing the oil into rapid and repeated contact with the heating surface of the tubes, and allowing the vapor formed in each circulating unit to become disengaged from the liquid in the upper drum."

The Smith patent (VII, 3224) shows the withdrawal of residue and the filtering of it through fuller's earth to rid it of carbon and carbon-containing material before returning it to the system, but says nothing about the presence of vapors in the coil.

Both Trumble and Edwards had vaporization in their coils in the accepted sense of the word "vaporization." Neither had vaporization in the coil in petitioner's asserted special sense of "vapor separation" or "liberation." Neither withdrew all the residue from the system.

Upon suffering a third rejection of his claims on these references (PX. 501, IV, 1535), Dubbs amended some, and rewrote others, including in all, for the first time, the limitation to heating the oil in the first step but "without substantial vaporization." The claims thus limited were allowed. Apparently the final amendment was filed pursuant to an oral interview between Dubbs's attorney and the Examiner, for it will be noted that, in making the amendment, the attorney stated (IV, 1540) "It is understood that subject to the discovery of additional prior art,

this amendment places this case in condition for allowance * * *."

Two of Dubbs's rewritten and allowed claims, namely, claims 4 and 5, when thus limited to "without substantial vaporization," were, at the same time, broadened so as not to call for the total withdrawal of residue and its non-return to the system. In this respect, Dubbs gave up the ground which he had previously relied upon to distinguish from Trumble and Edwards, *i. e., total* residue withdrawal and non-return. Thus, claim 4 of the Dubbs patent calls for *partial* residue withdrawal, and says nothing about returning the reflux "uncontaminated" with residue. The claim says:

> "* * * discharging from the chamber substantially continuously a quantity of the residue proportional to the amount of oil supplied * * *."

Rewritten and allowed claim 5 says nothing at all about residue withdrawal and its non-return, or about the reflux being "uncontaminated", and claims 1, 2, and 9 were made to call merely for the non-return of any substantial portion of the residue to the heating coil. Accordingly, none of these claims is directed to the supposed invention of "clean circulation" as defined by petitioner. They are "dirty circulation" claims, and they do not distinguish from Trumble and other prior art, unless by the limitation to "without substantial vaporization" in the heating coil. From this it follows that in, for instance, claim 4 of Dubbs, the phrase "substantial vaporization prevented" in the first step, or B tubes, means without that same substantial vaporization which Trumble has in his coil, namely, vapors and liquid in the condition of a foamy mixture. Otherwise, and specifically with respect to residue withdrawal, claim 4 does not distinguish from Trumble.

The substantial vaporization, or "foamy mass," in Trumble's coil is concededly indistinguishable from the substantial vaporization or "foamy mass" in respondent's coil. In neither process is there a condition in the coil where oil is "separated" or "liberated" from liquid in the sense contended for by petitioner.

As "vaporization," in Dubbs's claim 4, necessarily means the generation of vapors, it follows that the word has the same meaning in the limiting clause of all the other claims in suit.

The price of allowance of Dubbs's claims was the limitation against that vaporization which is present in Trumble's and Edwards's coils, this being the same vaporization that occurs in the respondent's coil.

In His Later-Issued Patent No. 1,686,654, Dubbs Also Imposed a Similar Claim Limitation Which Prohibited "Substantial Vaporization," and Also Used the Word in Its Accepted Sense to Denote the Change of State From Liquid to Vapor.—In confirmation of the fact that, in the patent in suit, Dubbs used "vaporization" in its accepted sense, there was received in evidence another Dubbs patent, No. 1,686,654 (VII, 3468), directed to a process of oil cracking, issued on October 9, 1928, on an application which was a division of another application which, in turn, was a continuation of Dubbs's application, Serial No. 208,206, filed December 21, 1917. This patent, No. 1,686,654, has, therefore, the same specification as application No. 208,206, filed over a year before the application for the patent in suit.

Dubbs patent No. 1,686,654 discloses a bank of coils B, set in a furnace and discharging into a tank K'. Among the objects of the specification is (VII, 3471, lines 50-57):

"• • • to provide a process whereby the forced

circulation in a continuous coil creates a pressure on the oil in excess of that maintained on the rest of the apparatus whereby the oil in said coil can be subjected to a higher heat **without being converted, to any great amount, into vapors,** and said oil is passed into a chamber of lower pressure * * *'' etc.

Claim 4 of the patent says:

"4. A process for the conversion of hydrocarbon oils which consists in heating a mass of relatively heavy hydrocarbon oil to a cracking temperature above the boiling points of the complex chemical constituents of said heavy oil **under sufficient pressure to prevent the vaporization of any substantial portion of said chemical constituents,**'' etc.

Relating the language of the claim to the language in the quoted passage from the specification, it is apparent that the prevention of "vaporization of any substantial portion" of the oil in the heating coil (required in the claim), is the same thing as heating the oil without its "being converted, to any great amount, into vapors" as taught in the specification.

In this same application, No. 208,206,* Dubbs gave his reason for avoiding vaporization in the heating coil. He said (DX. 816, p. 52, VI, 2976a):

"* * * As the Examiner will appreciate, trouble will occur if substantial vaporization takes place in the coils. To prevent the precipitation of carbon due to vaporization, the applicant maintains a high pressure on the oil in the coil."

The same association between vaporization and carbon formation is shown in Universal's instructions to its field

* While receiving in evidence the Dubbs patent No. 1,686,654, the District Court nevertheless excluded this Dubbs application, and it is before this Court under Rule 43 (c) of the Rules of Civil Procedure.

operators. In Bulletin B-536, dated January 15, 1926 (VI, 2977), Universal instructed its operators as follows, with respect to starting up the Dubbs commercial units:

> "Never permit the transfer temperature [coil outlet] to exceed 700° F. before 75 lbs. pressure has been reached. If the temperature is permitted to exceed that amount, vaporization will take place in the tubes, causing overheating and cracking of the oil vapors with the consequent deposition of carbon on the tube surfaces."

It should also be noted that in this Bulletin petitioner used "vaporization" in its accepted sense; vaporization is to be prevented by adjustment of temperature to pressure, which shows that vapor formation or generation is meant by "vaporization."

Petitioner Has Misrepresented and Misquoted the Testimony of Respondent's Expert Howard V. Smith.—On page 74 of its Brief, by incomplete quotation, petitioner seeks to convey the impression to this Court that Smith admitted that Dubbs's claims "don't fit" his specification illustration. In the passage immediately following that quoted by petitioner, Smith said (III, 1150):

> "I won't agree to the statement that taking my interpretation of 'vaporization', the claim is not only unsupported by this illustrative run but it is entirely contrary to the conditions which would obtain in that run because you picked out in that just part of the conditions given in the illustrative run. You have picked 36 gravity gas oil. You have picked the highest temperature given. And I say taking those particular conditions your claims don't fit with them, but those aren't the only conditions given in the illustrative run."

On page 76 of its Brief, petitioner says that "Smith began by assuming a meaning of the claims favorable to

his cause and then rewrote the specifications to fit that meaning." This extravagant assertion is supposed to be supported by the first quoted testimony on page 77 wherein Smith pointed out that the prohibition against vapor generation is found in the claims. As Dubbs's specification is wholly silent on the presence or absence of vapors in the B tubes or heating step, Smith was naturally forced to go to the claims to find the teaching against "substantial vaporization".

The second passage quoted on page 77 of petitioner's Brief is another instance of petitioner's practice of distorting testimony by incomplete quotation. The complete quotation is as follows (III, 1147):

> "I didn't mean to give the impression that a primary contention that I made is that due to the term 'without substantial vaporization' as I found it in the patent, that the Dubbs process is confined to one where there is no substantial vaporization in the B tubes, and practically all of the cracking is done in the C tubes; and that that is a very good and useful process. I did mean to say this, that at the low pressure taught in the illustrative run of the patent the amount of cracking which could be accomplished without substantial vaporization or vapor generation, if you prefer to use that, would be quite small. Now, if you go to higher pressures you can increase the amount of cracking there without getting into substantial vaporization."

In the third passage quoted on page 77 of petitioner's Brief, an attempt is made to gain advantage from an instance of poor abstracting of the testimony. In the original transcript (p. 3296) which has been certified to this Court by stipulation, the witness's meaning is quite clear:

> "Q. Is it your view, considering the Dubbs patent as a whole, that you don't get vapor generation in sub-

stantial amount in the B tubes and you don't get cracking in substantial amount in the B tubes?

"A. The patent is very—

"Q. Just tell me whether it is or is not, if you please.

"A. No, that isn't my view.

"Q. Is it your view that the Dubbs patent calls for liquid phase cracking practically exclusively in the B tubes, if any cracking occurs there?

"A. Correct.

"Q. Is that correct?

"A. Correct.

"Q. Is it your view that that sort of a process is a useful one?

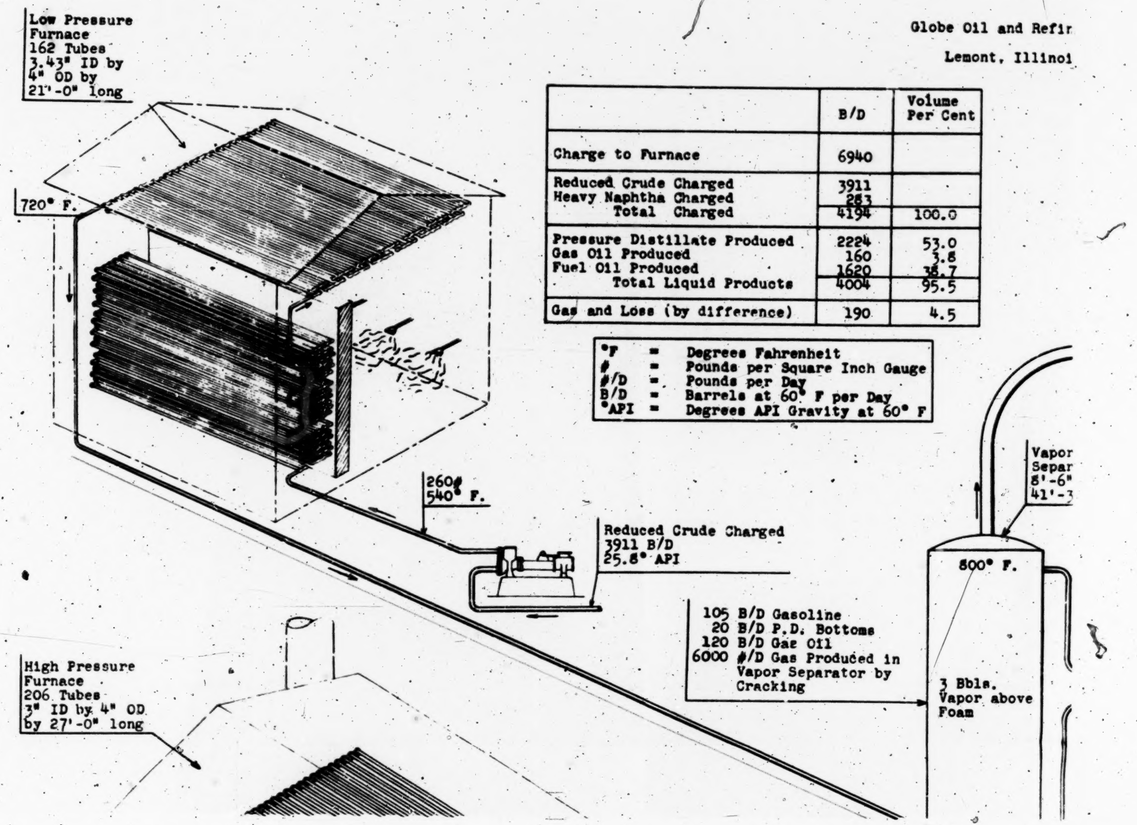
"A. It is my view that that could be very useful."

Obviously, Smith denied the first question because it coupled together the two elements, cracking and vapor generation. Smith always contended that cracking of the oil in the liquid state, that is, "without substantial vaporization," may occur in the B tubes (III, 1074, 1078, 1084-6, 1091, 1099, 1136-7, 1163), and that only substantial generation of vapors is excluded therein. Petitioner has always sought to misrepresent respondent's position on the Dubbs patent. Respondent does not contend that no cracking occurs in the B tubes. As much cracking is permitted therein as is consistent (a) with Dubbs's fundamental two-step "fireless cooker" cracking system which requires that the major cracking with consequent carbon deposition occur in an unheated vessel, and (b) with the claim requirement that the first step of the process in the B tubes be not accompanied by any substantial formation of vapors in those tubes.

On page 100 of its Brief petitioner asserts that Smith "admitted that the word 'vaporization' is often applied to the phenomenon characterized by the interdependent

Globe Oil and Refir

Lemont, Illinoi

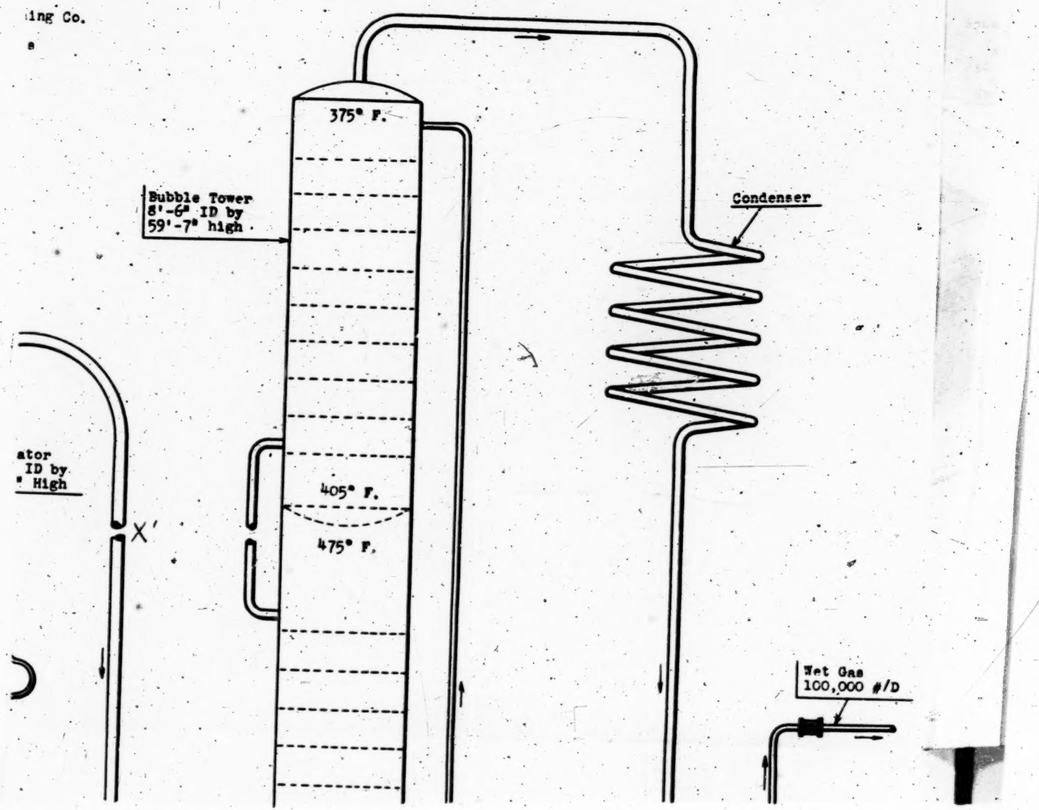


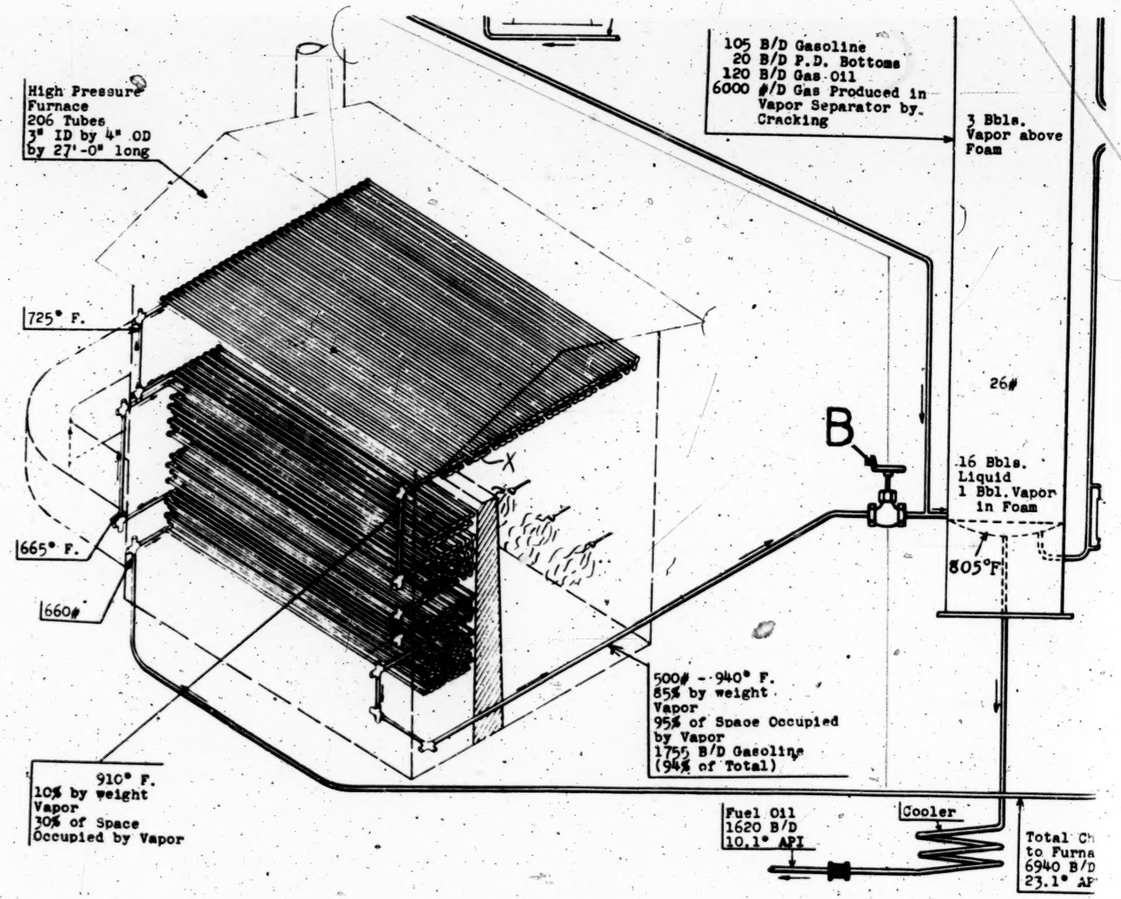
	B/D	Volume Per Cent
Charge to Furnace	6940	
Reduced Crude Charged	3911	
Heavy Naphtha Charged	283	
Total Charged	4194	100.0
Pressure Distillate Produced	2224	53.0
Gas Oil Produced	160	3.8
Fuel Oil Produced	1620	38.7
Total Liquid Products	4004	95.5
Gas and Loss (by difference)	190	4.5

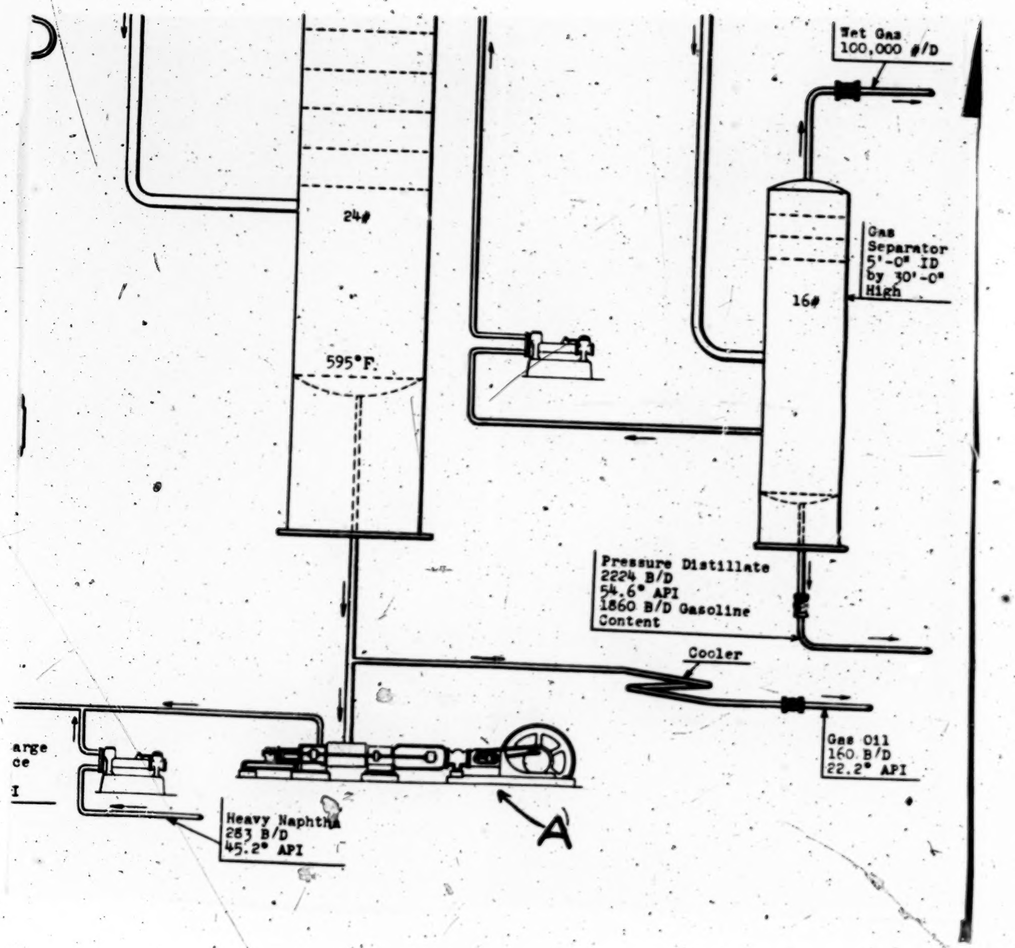
°F	=	Degrees Fahrenheit
#	=	Pounds per Square Inch Gauge
#/D	=	Pounds per Day
B/D	=	Barrels at 60° F per Day
°API	=	Degrees API Gravity at 60° F

ing Co.

e




High Pressure Furnace
206 Tubes
3" ID by 4" OD
by 27'-0" long
725° F.
665° F.
660#
910° F.
10% by weight Vapor
30% of Space Occupied by Vapor
105 B/D Gasoline
20 B/D P.D. Bottoms
120 B/D Gas Oil
6000 #/D Gas Produced in Vapor Separator by Cracking
3 Bbls. Vapor above Foam
26#
B
X
16 Bbls. Liquid
1 Bbl. Vapor in Foam
505°F
500# - 940° F.
85% by weight Vapor
95% of Space Occupied by Vapor
1755 B/D Gasoline
(94% of Total)
Fuel Oil
1620 B/D
10.1° API
Cooler
Total Ch
to Furna
6940 B/D
23.1° AP


Wet Gas
100,000 #/D
24#
595°F.
Gas Separator
5'-0" ID
by 30'-0"
High
16#
Pressure Distillate
2224 B/D
54.6° API
1860 B/D Gasoline Content
Cooler
Gas Oil
160 B/D
22.2° API
Heavy Naphtha
253 B/D
45.2° API
A

steps of vapor generation and vapor liberation." Smith testified without any qualification whatever (III, 1065) that "vaporization" denotes the change of state from liquid to vapor. He admitted the obvious fact that in some instances where vaporization occurs there is also a separation of vapors from the body of liquid, but he made it clear that in such cases the word applied only to the change of state (III, 1071).

RESPONDENT'S OPERATION.

Opposite this page, we reproduce Defendant's Exhibit 774A showing the respondent's operation in isometric simplified form.

Starting with pump A shown at the bottom of the drawing, a clean gas oil charging stock is fed to the cracking coils set in the furnace shown at the lower left-hand corner of the drawing and marked off with a red line. The furnace is carefully designed to provide even heating (Smith, III, 1121-2) and in the furnace coils the oil is raised to high cracking temperatures and is cracked and very substantially vaporized to the extent of 85% by weight and 95% by volume (III, 1120). The oil enters the furnace at a temperature of about 590° and leaves at a temperature of 940°. All of the gasoline produced from the material charged to the cracking coil is made in that coil (Smith, III, 1126).

On leaving the furnace, the oil passes through the valve B where pressure is reduced from 500 pounds in the coil to 26 pounds in the vapor separator. This is an intentionally abrupt drop, obtained by the use of the pressure reduction valve marked B; it is not a gradual reduction due to frictional resistance.

Just prior to entering the separator, the highly

heated stream from the high pressure furnace is cooled so as to stop the cracking (a) by the reduction in pressure, and (b) by the introduction of a cooler stream of topped crude from the low pressure furnace (III, 1127).

From the bottom of the separator, residue is continuously withdrawn and not returned to the system. From the top of the separator, the vapors of the cracked stream from the high temperature furnace and those formed by distillation of the topped crude from the low pressure furnace, pass off into the bubble tower. There, a further separation is made between the vapors of the desired product, which pass off from the top of the bubble tower and into a condenser, and the vapors of the fresh gas oil and the insufficiently cracked material, which are condensed and returned to the pump A, thus completing the cycle.

The red line shown on the drawing indicates the division of the operation into the heating, cracking, and vaporizing step, which occurs in the high pressure furnace, and the distillation and fractionating steps, which occur in the remainder of the apparatus. In the high pressure furnace, *the oil is heated to a high temperature, cracked with a short time factor, and substantially vaporized;* beyond the pressure regulating valve B, the cracking operation is stopped by cooling, and the only cracking which occurs in the separator (amounting merely to 2½% of the topped crude charged) is that slight cracking of the topped crude which is incidental to its distillation (Smith, III, 1128-9). Only enough liquid is kept in the separator to effect a liquid seal. At the end of a long run only a few wheelbarrowfuls of carbon are found in the separator (Smith, III, 1130).

Like the prior coil cracking art, and unlike Dubbs's

process, the respondent applies both the cracking *heat* and the cracking *time* to the oil in the same part of the apparatus (the coil), and reduces pressure and checks the cracking operation beyond the pressure reduction valve, so that practically no cracking occurs in the vapor separator. Also, like all the continuous prior art cracking processes, respondent withdraws residue continuously during the run.

Like all cracking processes of the prior art, (except Behimer's), and unlike the process of the Dubbs patent, respondent's process is limited to the use of a clean stock as charge material to the coil, and to the necessity of limiting the cracking operation in the directly-fired coil to that point short of which carbon would begin to deposit on the highly heated metal (Smith, III, 1126).

Unlike the process defined in the claims in suit of the Dubbs patent, there is very substantial vaporization of the oil in respondent's cracking coil.

Like the process of the Dubbs patent, respondent returns reflux to the coil inlet, a step, however, which is disclosed in the prior patent art (*post*, pp. 61-77), and which in respondent's process, has solely the functions and benefits which it had in that prior art, namely, conservation of the contained heat of the reflux. In respondent's operation this step does not have the distinctive function that it has in the Dubbs patent, for respondent deliberately cools the stream entering the vapor separator to stop the cracking reaction.

The product made in respondent's process is the typical unsaturated, off-color, strong-smelling, hard-to-treat gasoline characteristic of high temperature vapor phase processes. This product is no longer objectionable, but is today at a premium because it contains the valuable antiknock qualities requisite for use in modern high compression engines (Reiman, III, 1230; Smith, III, 1135).

THE PRIOR PATENT ART DISCLOSES "CLEAN CIRCULATION".

The District Court held against the respondent, and in favor of petitioner, on the question of whether "clean circulation" was disclosed in the prior patent art, and the majority of the Court of Appeals did not pass on the question. Judge Lindley, however, concurred in the affirmance of the judgment on the ground that the Dubbs patent "was invalid because the prior art patents showed anticipation" (VII, 3584). Moreover, in the recent Tenth Circuit case of *The Texas Company* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829, the Circuit Court of Appeals* held that certain of the same prior art patents relied on in the case at bar disclose the so-called "clean circulation" steps in a cracking process. The patent there in suit was Behimer 1,883,850 (*post*, p. 77) which, like Dubbs, solved the carbon problem by a two-step cracking process. The Texas Company, like petitioner here, sought to ignore the basic cracking process of the Behimer patent, and to secure for its claims an interpretation covering "clean circulation" broadly in any type of cracking process. The decision of the Court was that this construction was inadmissible, and that the claims, if so construed, were invalid in view of the prior patent art.

The prior art patents which the Tenth Circuit Court held were disclosures of "clean circulation" are Pielsticker, British No. 1308 of 1891 (DX. 790, VII, 3531) and United States No. 477,153 (DX. 792, VII, 3126), Ellis No. 1,396,999 (DX. 804, VII, 3352) and Hall No. 1,175,910 (DX. 793, VII, 3200). *Not one of these patents was cited against the Dubbs application during the Patent Office prosecution.*

* Affirming District Judge Kennedy's decision reported in 32 F. Supp. 347. The decision on appeal was handed down after District Judge Holly rendered his Opinion in the case at bar.

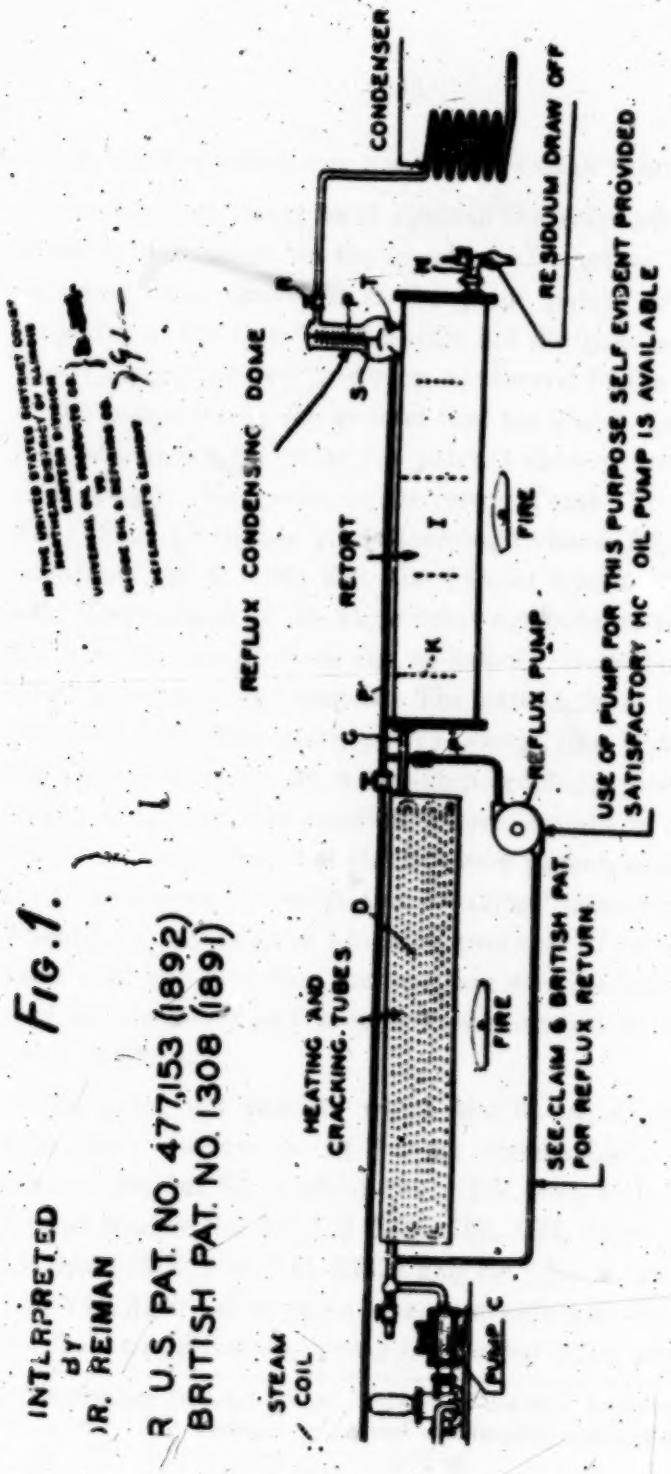


FIG. 1.

These patents do not teach Dubbs's two-step "fireless cooker" cracking system and, therefore, only anticipate Dubbs's claims if, as petitioner contends, they depend for novelty entirely upon the "clean circulation" idea.

Pielsticker British Patent No. 1308, and Pielsticker United States Patent No. 477,153.—These two patents may be considered together because their disclosures are substantially the same. The figures shown in the drawings of these patents are not assembled to show a complete apparatus. Accordingly, respondent's witness, Dr. C. K. Reiman, prepared an assembled drawing (VI, 2819) which is reproduced opposite this page. Dr. Reiman's testimony as to these Pielsticker patents appears in Volume III, at pages 1207-18 of the Record.

Referring to the drawing, the supply of oil to be charged to the system is contained in the tank A. From this supply tank, the charge is introduced by the pump C into the cracking tubes D, from whence it is passed to the retort I. Both cracking tubes and retort are fired and cracking takes place in both. From the retort, vapors pass to the dephlegmator or condensing dome P, from the top of which the vapors of the desired product are led off to a final condenser, and from the bottom of which the condensed vapors of the insufficiently cracked products (reflux) are returned, according to the specifications of both the United States and British patents, either to the retort I or to the oil supply tank A. The return to the tank A is shown by the line carrying the reference letter P'.

In both the United States and British patents, residue from the cracking operation is withdrawn through a draw-off line marked N on the drawing and is not returned to the system.

In the supply tank A, the reflux from the condensing dome P mixes with the fresh charge, the mixture then passing to the cracking tubes D via the pump C. The return of reflux to an oil supply tank is one of the "clean circulation" alternatives disclosed in the Dubbs patent in suit wherein the supply tank is designated by the letter L. Petitioner has omitted from its Plate III this alternative teaching of clean circulation.

It should be noted that this method, disclosed in both Pielsticker and Dubbs, of returning reflux to a supply tank, presents no mechanical difficulties whatsoever. No hot oil pump is needed, nor is it necessary to elevate the dephlegmator to any substantial height. The reflux simply flows back to the supply tank where it mixes with the fresh charge. From this tank the mixture is pumped into the coil.

The British Pielsticker patent No. 1308 teaches, in claim 6, another alternative—that of returning the reflux from the condensing dome directly into the heating coil (the other "clean circulation" alternative of the Dubbs patent). This reflux return line is shown on the drawing as a branch of the line P' leading to and through the pump marked "Reflux Pump" on the drawing, and from there to the coil, where the reflux mingles with the fresh charge. Pielsticker does not disclose this reflux pump, but it is an obvious expedient once a pump capable of handling hot oil became available (Brown, II, 718; Reiman, III, 1211).

Claim 6 of the British Pielsticker patent is as follows (VII, 3534):

> "In apparatus for the continuous distillation of hydrocarbon and other oils and liquids, a dome, connecting a retort with the goose neck and condenser, provided inside at its base with an annular cup, in which the heavier portions of the oil vapours con-

densed in the dome collect, and from where they can be returned into the supply tank, **or into the heating coil**, or into the retort, substantially as described."

The Pielsticker patents describe cracking of the hydrocarbon oils in the following terms (British No. 1308, p. 2, lines 45-49, VII, 3532):

"* * * This dome may be provided with a number of baffle plates S, which force the vapours to come in contact with the inner surface of the dome P, where the heavier portion of them are caused to condense and returning to the more heated surface of the retort, **are reduced in gravity** and **finally** distill over and condense in the condenser."

To reduce in gravity is to crack the oil (III, 1204). The further statement that when reduced in gravity the oil "*finally*" distills over also shows that cracking *precedes*, and is distinct from, distillation. If mere distillation were intended, as found by the District Court, the word "finally" would be entirely superfluous.

The patent also states (p. 3, lines 7-13, VII, 3533):

"When it is intended **to produce still lighter gravity oils**, a valve R may be placed between the outlet of the retort I and the condenser U" etc.

The production of "still lighter gravity oils" likewise teaches cracking (III, 1208-9).

The corresponding passages in the United States Pielsticker patent No. 477,153 are found on page 2, lines 76-83, and lines 106-117 (VII, 3136).

The function of the dome P is expressly described in the Pielsticker patents as a condenser. Thus, the British patent says in the first passage quoted above that the "heavier portion" of the vapors "are caused to condense" by "contact with the inner surface of the dome P" which is, of course, air-cooled (Reiman, III, 1209-10).

Claim 6 of the same patent also describes the function of this dome as a condenser. The claim says that the dome is "provided inside at its base with an annular cup, in which the heavier portions of the oil vapours *condensed in the dome* collect, and from where they can be returned into the supply tank, or into the heating coil, or into the retort, substantially as described."

Petitioner contended in the lower courts that the cracking process disclosed in the above quoted passages from the Pielsticker patents, is not a cracking process, but is mere simple distillation. But in a former case* petitioner construed the United States Pielsticker patent as teaching a cracking process with condensation of the reflux and its return to the system for further cracking (DX. 827A, VI, 3013)—a construction which is in agreement with the plain disclosure of the patent.

Opposite this page is reproduced a drawing showing in Figure 1,† the drawing of Pielsticker's British and United States patents as interpreted by respondent's expert in the case at bar (DX. 791, VI, 2819), in Figure 2, Universal's interpretation of the United States Pielsticker patent in the *Warner-Quinlan* case (DX. 827B, VI, 3015), and in Figure 3, petitioner's present interpretation of the patent (PX. 837, IV, 1875). From this drawing, it is apparent that in the *Warner-Quinlan* case, when Universal was defendant, its construction of Pielsticker agreed with respondent's

* *The Texas Co.* v. *Warner-Quinlan, Inc.* (U. S. D. C. for District of New Jersey, 1927). Warner-Quinlan, Inc., was a Universal licensee, and Universal, by counsel who also appear for it in the case at bar, successfully defended that case and wrote the Brief, excerpts from which are here in evidence (VI, 2997-3015).

† This Figure uses the reference characters of the British patent, and where these are not the same as the U. S. patent, the corresponding reference characters of the U. S. patent are also shown in red.

AS INTERPRETED
BY
DR. REIMAN

FIG. 1.

PIELSTICKER U.S. PAT. NO. 477,153 (1892)
BRITISH PAT. NO. 1308 (1891)

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
UNIVERSAL OIL PRODUCTS CO.
VS.
GLOBE OIL & REFINING CO.
DEFENDANT'S EXHIBIT 791

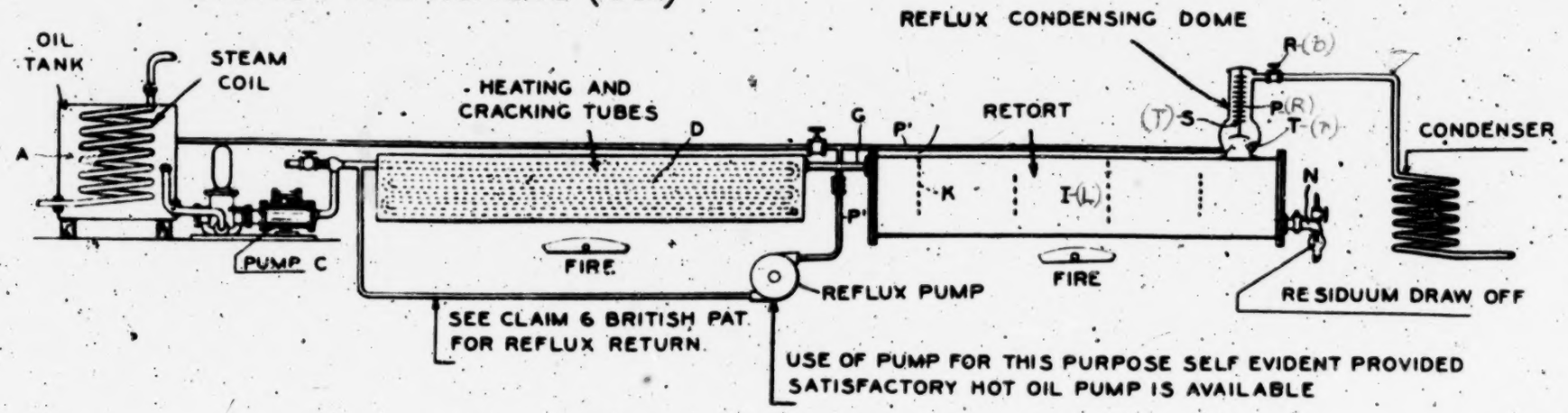


FIG. 2.

DX-827B U. S. Pat. 477153.(Ex. 181, as Interpreted by Defendant in Warner-Quinlan Case, Plaintiff in Instant Case)

PIELSTICKER - DEF'T EXB. 181:

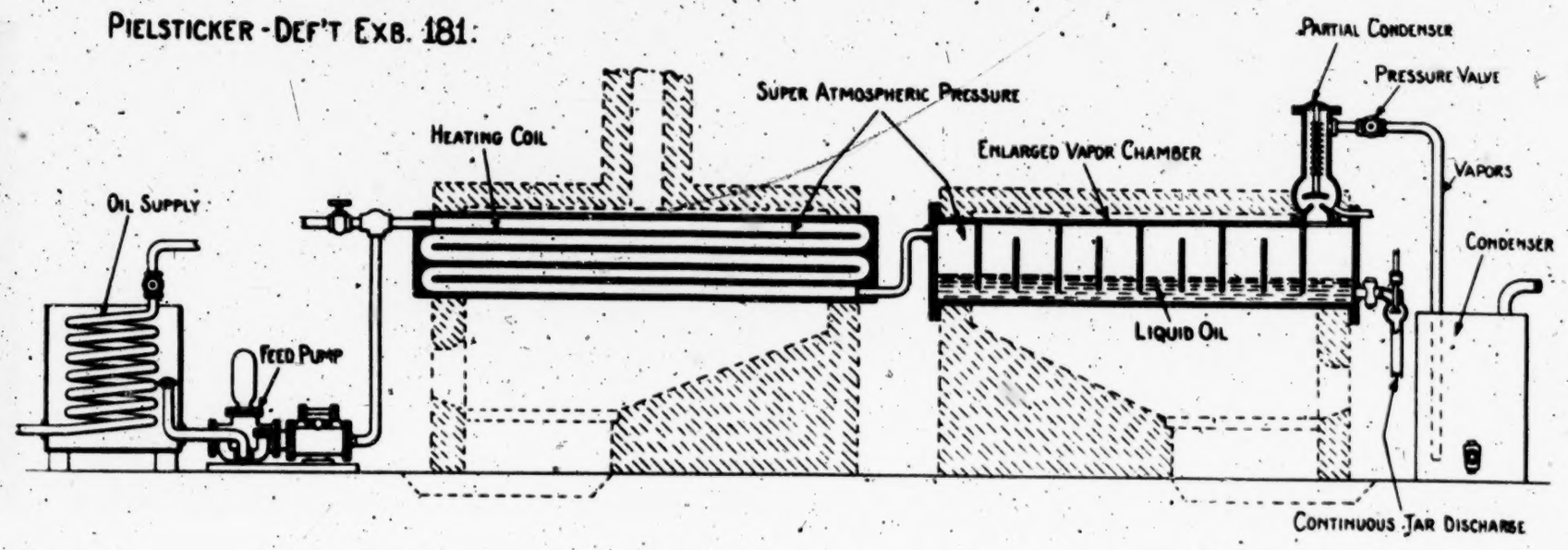


FIG. 2.

DX-827B U. S. Pat. 477153 (Ex. 181, as Interpreted by Defendant in Warner-Quinlan Case, Plaintiff in Instant Case)

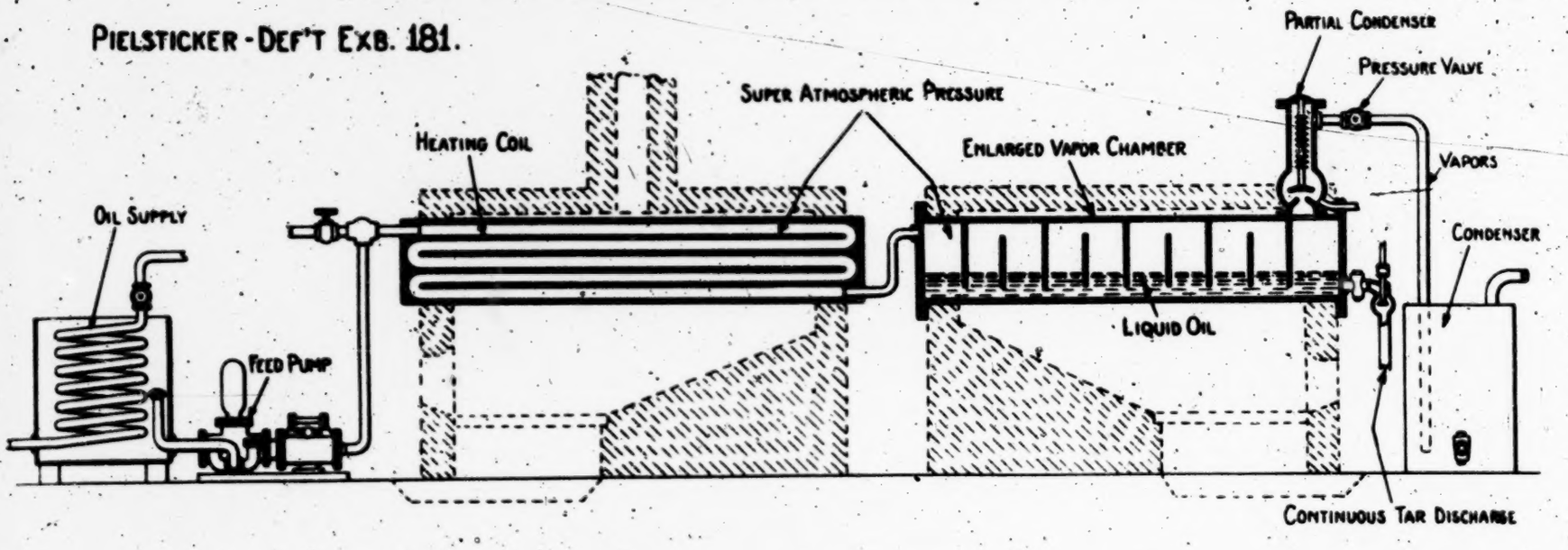
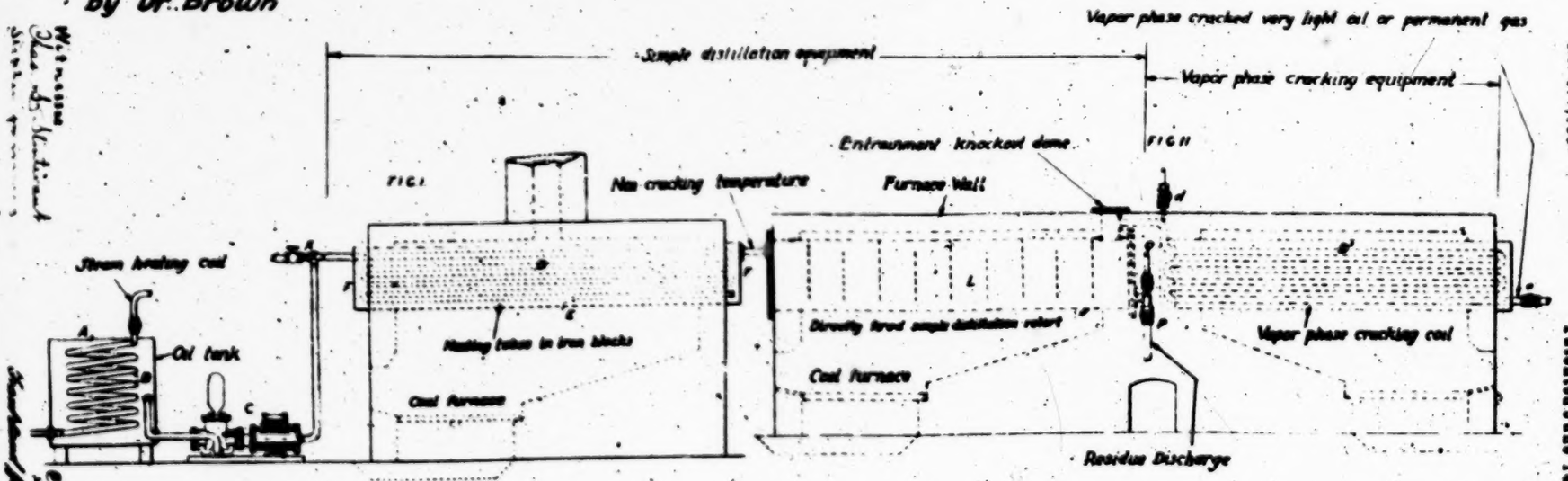


FIG. 3.

As interpreted by Dr. Brown

PX-837 (As Interpreted by Plaintiff in Instant Case.)



C. M. PIELSTICKER.
DISTILLATION OF HYDROCARBON OR OTHER OILS.
No. 477,153 Patented June 14, 1892

construction in the case at bar; and differs widely from its present interpretation of the same patent.

Petitioner's present drawing (Fig. 3) disregards Pielsticker's coil and drum cracking process, and portrays only a further cracking disclosure in Pielsticker where he wants to produce "very light oil or permanent gas"—a disclosure of no concern whatever to the issues in the present case.

In the *Warner-Quinlan* Brief, Universal stated, with respect to the United States Pielsticker patent that (DX. 827A, VI, 3013):

> "* * * Vapors are described as condensing therein [dome R], the condensate returned and *reduced in gravity or otherwise stated, recracked* (p. 2, lines 76 to 83)."

Universal also contended that the references to carbon in the Pielsticker patent likewise indicated cracking (DX. 827A, VI, 3013, 3014):

> "The excessive quantity of carbon formed in the coil D is the result of cracking of the oil therein. Carbon only forms when cracking occurs.
>
> * * * * *
>
> "Plaintiff may suggest that the carbon repeatedly referred to in the patents is in fact a deposit of some other material. This view would contradict the plain statements of the patent that carbon is formed in the heating tubes and make unnecessary the use of the highly developed Pielsticker apparatus intended to overcome the carbon menace. The patent refers to carbon formed in the coil and it must be assumed that the skilled patentee had in mind carbon and not some other material that plaintiff may suggest. Such a view, if entertained, would permit the disclosure of any prior art item to be completely nullified by speculative suggestions."

Universal's same Brief recognized that in the Pielsticker patent "residuum is continuously removed from the

retort I, and isolated from the system" and that "charging oil and reflux" are returned "for recracking" from the supply tank A (VI, 3013). Thus Universal has previously admitted that Pielsticker discloses the two "clean circulation" steps which it now asserts are the novel elements of the Dubbs patent.

Ellis Patent No. 1,396,999 (DX. 804, VII, 3352).—Opposite this page, we reproduce Figure 3 of the Ellis patent. The process of this patent is fully described by Dr. Reiman (III, 1243-8).

The feed for the process, which is a distillate stock, is forced into the cracking coils 4, 4a, 4b, and 4c at the point marked 5. At this point also, steam may be introduced into the charge. The oil is vaporized and cracked in the cracking coils and the effluent from the four cracking coils combines in the pipe 7 and enters the large digester 8, in which further cracking is carried on. From the digester 8, the hydrocarbons, in vapor form, enter the fractionating device 10 through the line 9. This fractionating device is described in the patent as (p. 1, line 104, p. 2, line 2):

> "* * * a dephlegmator or fractionating column which preferably is of a type used in the rectification of alcohol and the like in place of the ordinary coarse dephlegmator used in the present day rectification of oil * * *."

This shows that the dephlegmator used is a bubble tower—the most efficient of all fractionators. All the vapors entering the bottom of the bubble tower are cooled and condensed therein, except the gasoline vapors which are taken off overhead.

The bubble tower is fitted with three petcocks 11, 11a, and 11b, from which three sidestreams of condensate of differing gravities are to be withdrawn (III, 1245-6).

C. ELLIS.

MAKING GASOLENE SUBSTITUTE.

APPLICATION FILED OCT. 4, 1913.

96,999.

Patented Nov. 15, 1921.

3 SHEETS—SHEET 2.

Fig. 3.

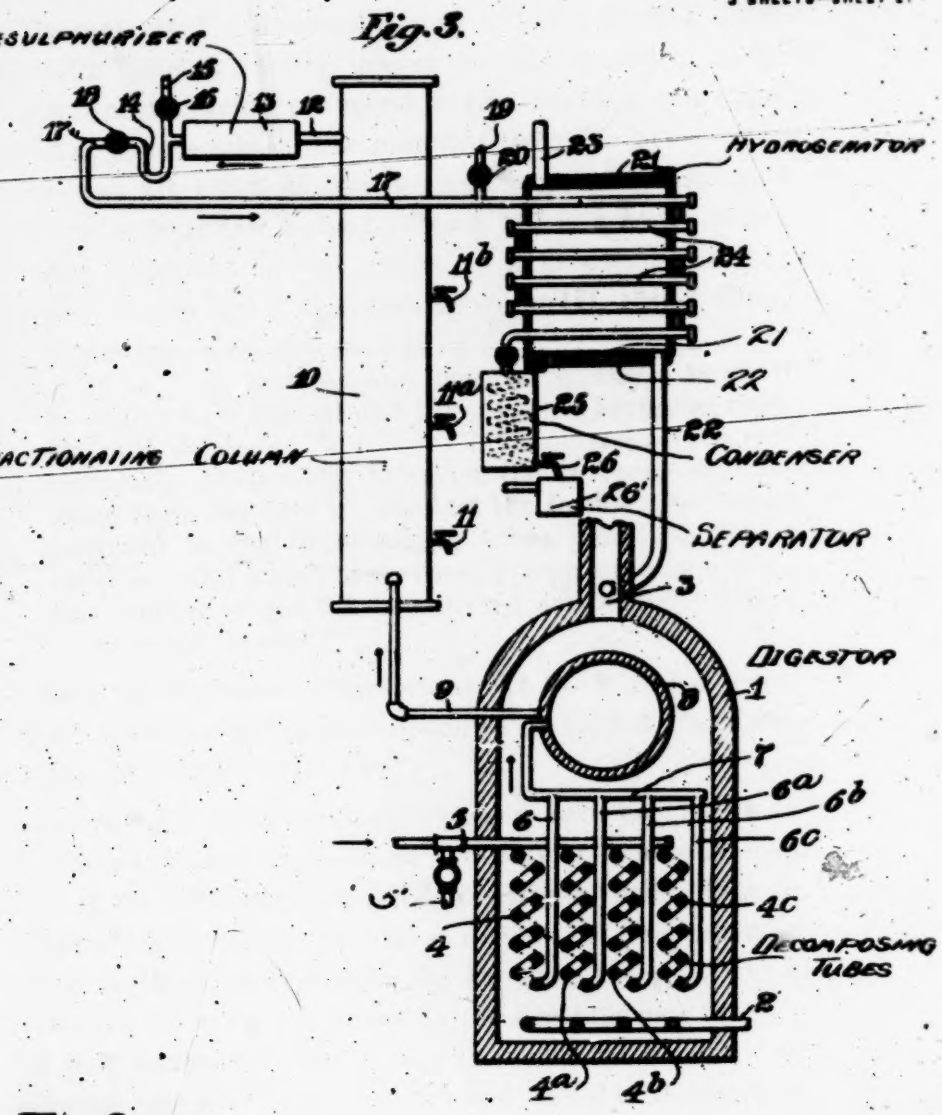


Fig. 5.



Witness:

Mr. Yates

M. Ellis.

Inventor:

Charles Ellis

The material "withdrawn" (pat. p. 3, line 38, VII, 3359) from the petcock 11, the lowest one in the tower, is, of course, the residuum produced in the cracking operation, which is not recycled. The material from the petcock 11a is the gas oil which is likewise not recycled. The third sidestream from the highest petcock 11b is a hydrocarbon fraction described in the patent as a kerosene and this kerosene *is* recycled to the cracking coils (III, 1246). Thus, the patent states (p. 2, lines 5-14):

> "* * * a dephlegmator may be arranged to yield as fractions a gas oil and unconverted kerosene especially if the latter [kerosene] is employed as the raw material. Preferably, however, the kerosene is separated from the heavier oils **and the former** [kerosene] **returned to the decomposing tubes** while the latter [heavier oils] which is preferably separated as a fraction similar to gas oil, is collected and suitable disposition made thereof."

Thus, the kerosene withdrawn at 11b is not only "separated" from the residuum withdrawn at 11, but also from the gas oil withdrawn at 11a.

Accordingly, Ellis *returns* the clean kerosene reflux to the cracking tubes and *collects* the heavier fractions—gas oil and the residuum,—which are not returned. This is "clean circulation" as petitioner defines it. The patentee clearly distinguishes between the kerosene fraction, which he teaches is to be "*returned* to the decomposing tubes," and the heavier fraction (gas oil), which he teaches "is *collected* [obviously, in a tank] and suitable disposition made thereof."

Petitioner contended in the courts below that Ellis does not disclose any particular means for returning reflux admixed with the fresh feed to the cracking coil.

Ellis says, however, to "*return*" the kerosene reflux to

the decomposing tubes, and the man skilled in the art could readily avail himself for this purpose of Pielsticker's supply tank.

Furthermore, hydrostatic return of reflux was well known in Ellis's time, and Ellis's drawing shows an elevated dephlegmator which would furnish hydrostatic pressure (III, 1247). Ellis's cracking coil is designed to permit the oil to flow therethrough with fairly low frictional resistance. Thus, Ellis shows four parallel coils such as were used by the petitioner in one of its early installations at Wood River, Illinois, known as the Roxana Unit No. 1, for the purpose of reducing the hydrostatic head required. The dephlegmator in Roxana No. 1 gave a head of only 12 feet (II, 602).

As of Dubbs's filing date the man skilled in the art could have carried out Ellis's instruction to "return" the reflux by using the Thompson hot oil pump (*post*, p. 81).

Hall Patent No. 1,175,910 (DX. 793, VII, 3200).—Opposite this page, we reproduce the drawing of Hall patent No. 1,175,910. Dr. Reiman's testimony regarding the technology of this patent is found in Volume III, pages 1218-30 of the Record.

Referring to the drawing, the oil is passed through a pump into the preheating coils 2 and then into the cracking tubes 4, where all the cracking of the process is conducted in substantially vapor phase (III, 1219). The material in these tubes is maintained under pressure by the valve 8, beyond which pressure is released. This release of pressure produces, by expansion, a reduction in the temperature of the cracked stream of hydrocarbons which then passes to the first dephlegmator 9. In this dephlegmator, the material is further cooled, and a separation is effected

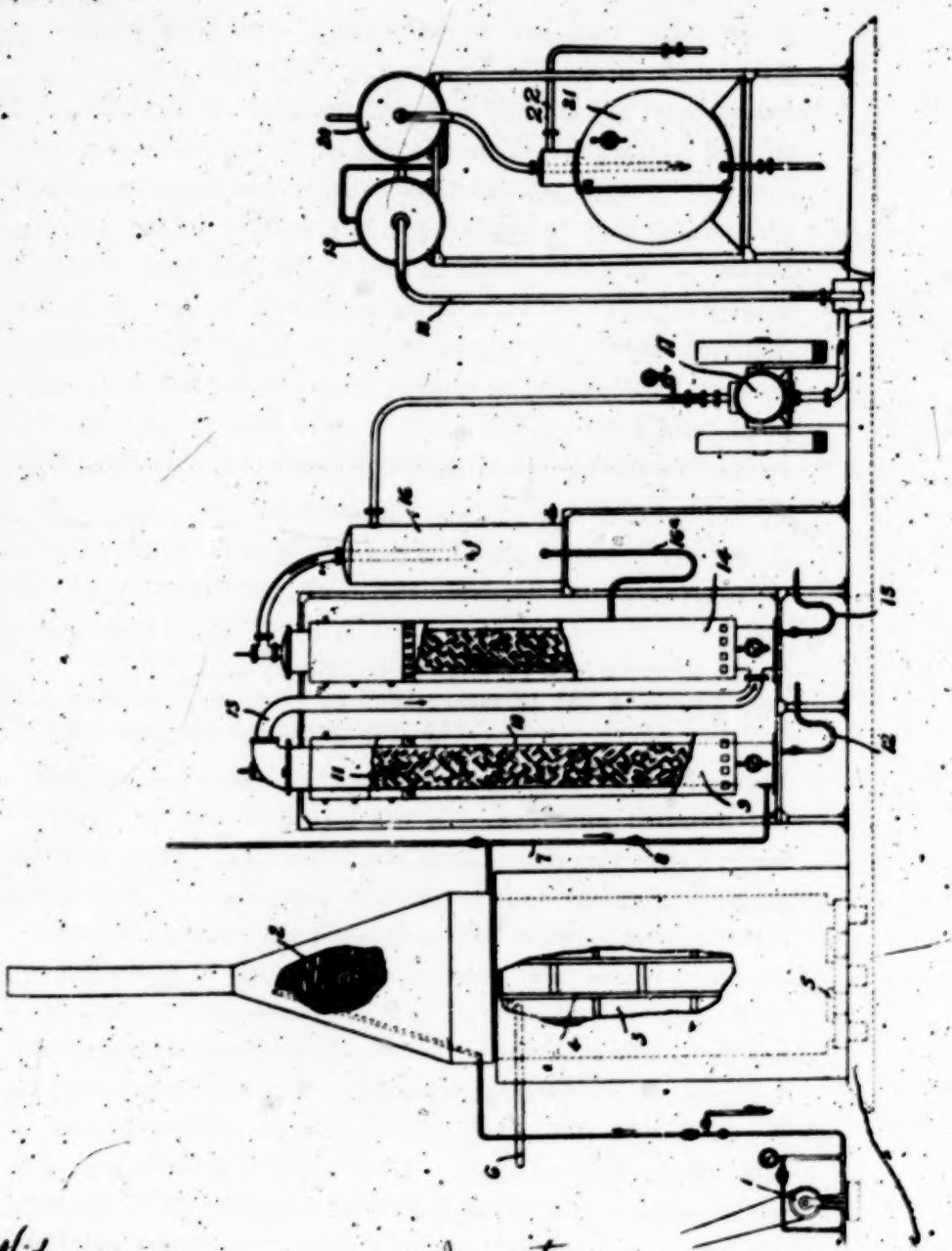
W. A. HALL.

PROCESS OF MAKING MOTOR FUEL.

APPLICATION FILED JAN. 23, 1915.

1,175,910.

Patented Mar. 14, 1916.



Witnesses

Inventor

of vapors from the liquid "heavy residue" (pat. p. 2, line 122; III, 1218-19). This heavy residue is withdrawn from the system through the line 12 and the vapors are transferred by line 13 to the second dephlegmator 14. In this second dephlegmator, there is further cooling and condensing of the vapors and separation of this condensate from the vapors of the desired product, which latter passes out of the top of the dephlegmator 14 as vapor which is converted into liquid in a final condenser. Both dephlegmators are subjected to air cooling to reduce the temperature and this, with the further cooling resulting from pressure reduction, stops cracking in these dephlegmators.

The condensate withdrawn from the second dephlegmator 14 is referred to by Hall as a "light residue" (pat. p. 2, line 1). Concerning the disposition of this material, the patent says (p. 3, lines 2-4):

> "• • • This residue is usually of a gravity of about 0.880 and **is used as raw material for a second run through the cracking coil 4.**"

Respondent contends that this teaching of using the light residue "as raw material for a second run through the cracking coil 4" is a teaching of what petitioner calls "clean circulation." Petitioner contended that the indication is insufficient because the passage might be construed to mean the collection of the light residue or reflux and its use on a subsequent occasion. Further light is thrown upon how this language would be construed by the man skilled in the art by reference to Hall's other patents, which are referred to by application number in the Hall '910 patent (p. 3, column 2, lines 3-5, VII, 3203). Thus, in Hall patent No. 1,242,796 (VII, 3230), in referring to the advantages accruing from pressure reduction at the coil outlet and before discharge into the first dephlegmator—a feature common

both to the '910 and '796 patents—it is stated in the latter patent (VII, 3232, p. 2, lines 40-51):

> "By thus lowering the pressure and cooling to the desired temperature, substantially all of the free carbon and very difficultly volatile material separates in the first trap 10,* and the material which separates in the second cooler and trap† is free from solid carbon and free from coke-like material, and this second condensate (termed 'light residue') **can be directly employed for making a second 'run' through the apparatus, without filtration or other preliminary treatment.**"

Thus, Hall teaches that where pressure is reduced and where there is sufficient cooling, the condensate in the second dephlegmator is clean enough to be "*directly*" employed for making a second run without filtration or other preliminary treatment. This, combined with the withdrawal and non-return of "heavy residue", taught in the Hall patents, is what petitioner calls "clean circulation."

Vapor Phase Processes Operated Successfully Regardless of Petitioner's Theories.—Petitioner asserts (Br. p. 13) that vapor phase processes were failures because coke or carbon was deposited in the heated tubes, thus forcing shut downs, as the result of a separation of vapors from the liquid oil occurring in said heated tubes. This assertion is based on its expert's theory that in vapor phase cracking you must have "completely dry" vapors. In order to get such vapors, Dr. Brown testified that the charging stock must be "of such a low boiling range" *i. e.*, low end point, so "that it is converted to dry vapor by the time it begins to crack actively in the tubes" or "that the material be passed through a vapor liquid separating step prior to

* Corresponding to the first dephlegmator 9 of Hall's '910 patent.

† Corresponding to the second dephlegmator 14 of Hall's '910 patent.

entering the cracking tubes and only the vapor freed from entrained liquid be introduced into the cracking tubes" (III, 1364).

However, as Dr. Brown conceded that a gas oil stock having an end point of 750° or possibly 800° (III, 1443), was "low-boiling" within the requirements of his theory, and that it could be charged to the coil in vapor phase operations without a "vapor liquid separating step," he in effect conceded that his theory requires merely that a clean distillate stock must be used—a fact which the art well knew (III, 1461-2).

As the basis for his "vapor liquid separating step" theory, Dr. Brown relied on his experience with a small pilot plant operated at Chattanooga, Tennessee, in 1920 or 1921 and upon calculations which he had made (III, 1462). He did not submit any tangible evidence as to charging stocks used or other operating data regarding the operation of this pilot plant, and did not state what the calculations were.

Against these theories, the Record shows as fact that:

(a) At The Texas Company's plant at Bayonne, N. J., a commercial vapor phase operation was carried on for about two years, using for a charging stock kerosene (II, 852), redistilled paraffin gas oil (III, 1043), and paraffin gas oil (DX. 635, V, 2445-6). During this period, in January and February, 1917, a continuous run of fifteen days was made on kerosene charging stock (DX. 850, VI, 3033).

(b) At the plant of the Skelly Oil Company, Mr. Howard V. Smith successfully conducted, from 1927 to 1938, commercial vapor phase processes designed by the Skelly Company (III, 1172) that used a gas oil charging stock. These operations were conducted without Dr. Brown's

magic "vapor liquid separating step" and the vapors were cracked when "wet" as well as after they became dry (III, 1057, 1171-3).

(c) Dr. Reiman testified (III, 1229, 1249, 1297) to several years' experience in vapor phase cracking operations, using an ordinary gas oil (32-35 Bé.) as his charging stock without encountering any difficulty.

ALL THE STEPS OF RESPONDENT'S PROCESS ARE DISCLOSED IN THE PRIOR PATENT ART, AND ALL FUNCTION IN RESPONDENT'S OPERATION PRECISELY AS IN THIS ART.

Before correlating (*post*, pp. 75-6) the steps of respondent's operation with the similar steps in the prior patent art, we must first describe the Benton, Alexander and Greenstreet patents.

Benton, British, No. 1922 (VII, 3527).—This patent, which issued in 1887, discloses a coil cracking operation with continuous charge to the coil, and continuous residue withdrawal. It does not show the return of reflux to the coil inlet.

Alexander Patent No. 1,407,619 (VII, 3364).—Alexander* teaches eight different variations of cracking processes, but the only one in which we are interested is that illus-

* Petitioner contends (Br. p. 13) that the Alexander patent is inoperative because a so-called Alexander process at the Gulf Refining Company in 1917 was a failure. A sufficient answer is that this operation did not embody the process taught in the Alexander patent with reference to Fig. 8 which is the disclosure that respondent relies upon. Taber, who was in complete charge of this operation, admitted that he did not know (III, 1348) "what particular process of the eight figures of the Alexander patent was operated." Mechling testified (III, 1358) that at the Gulf Refining Company "there were 40 parallel passes to one vaporizing furnace" and that he had "never tried" the single tube vaporizer disclosed in the Alexander patent.

trated in Fig. 8 of the patent and described in the specification in the passage on page 6, beginning at line 42 (VII, 3378).

Dr. Reiman prepared a simplified drawing of this operation. Referring to this drawing (DX. 808, VI, 2897), the process described by Dr. Reiman (III, 1256-64), is the same with the flap up and the flap down, except that with the flap up a shell still is shown for vaporizing the oil to be cracked, and the reflux is fed to the shell still by gravity, whereas, with the flap down, the vaporizer comprises a tubular vaporizer 75, to which the reflux is fed by a reflux pump shown in Alexander's drawing (III, 1258). Both alternatives, *i. e.*, shell still, or coil, are disclosed in the patent. Alexander fully discloses the "clean circulation" steps of continuously withdrawing residue, and continuously returning clean reflux to the cracking coils.

Alexander teaches (pat. p. 6, lines 44-53, VII, 3378) the production *in situ* of a clean charging stock for the cracking coil, as practiced by respondent. He utilizes the heat contained in the highly heated, cracked effluent vapors from the cracking tube to distill crude oil in the vapor separator or exchange tower 110. The condensed vapors resulting from this distillation are returned with the reflux to the cracking coil as charging stock for the process. The dirty residue is withdrawn from the vapor separator.

Alexander adds to the prior coil cracking art the so-called "quenching" step which serves a dual purpose. It stops the cracking in the vapor separator and produces clean charging stock for the cracking coil.

The description of the Alexander process (VII, 3378, pat. p. 6, lines 42-100), incorporating the steps of returning clean reflux to the coil inlet and of cooling and distilling

out a clean stock *in situ* can be directly applied to respondent's operation. With respect to this description in the patent, petitioner's expert, Dr. Brown, admitted that (III, 1405):

> "We have then a vapor phase operation supplying vapors to the cracking tubes 113 which could be operated in a reasonably satisfactory manner insofar as the keeping of the plant on stream is concerned, provided the cracking tubes and the other parts are properly designed."

Greenstreet Patent No. 1,740,691 (VII, 3476).—The drawings and specification of this patent are complicated and difficult to follow only because the patentee chose to describe six topping* and six cracking units, all in one engineering drawing. Respondent's simplified drawing (VI, 2959) shows only one topping and one cracking unit taken directly from the patent drawings. It illustrates all the steps of the Greenstreet patent, and was used by Dr. Reiman in his discussion of this patent (III, 1264-86). Dr. Brown made use of a like drawing (PX. 838, IV, 1879) in order to make his presentation. The following general description of Greenstreet's process steps is not in dispute:

Greenstreet preheats crude oil, drawn from a tank 11a, in the topping coils 15, and mixes this partially vaporized crude with the high temperature cracked vapors from the vapor phase cracking coils 2 in the digester tank 22, where a further quantity of the crude is vaporized, and the heavier parts of the cracked vapors are condensed. Residue from both the cracked vapors and from the heaviest part of the crude is withdrawn from the bottom of tank 22 through line 41 and is discarded. The vapors from digester 22 (contain-

* A topping unit is one where by simple distillation the light ends or "tops" are removed from the crude oil.

ing "gas oil" from the crude, and unconverted heavier fractions from the cracked vapors, together with cracked gasoline and the gasoline naturally occurring in the crude, plus permanent gas and some steam) are led through eight other digester tanks in series, and from the top of the last of these, only the vapors of the desired product, gasoline (and the permanent gas and steam), pass on to the final condenser. All of the fractions heavier than gasoline, that are "condensed" in these eight digesters, are collected and fed through the line 42 to the "distillate storage tank 11" (pat. p. 2, line 90). This is the only material which is fed to the vapor phase cracking coil.

Thus, Greenstreet shows respondent's steps of preheating a crude charging stock and distilling it by heat exchange with the hot effluent from the cracking coil in order to prepare *in situ* a combined gas oil and reflux charge for the cracking coil.

Summary.—Opposite the next page we show the prior art antecedents of respondent's coil cracking process. In this diagram the figures are arranged so that the several steps of each process appear beneath each other. The coloring indicates like material in each figure, *i. e.*, fresh charge—blue, combined feed—green, reflux—yellow, and residue—brown.

Respondent's is a continuous coil cracking process like that disclosed in the Hall patents hereinbefore described. In respondent's process, as in Hall's, (1) substantially all the cracking is carried on in the cracking coil wherein the oil is brought to the cracking temperature, substantially vaporized, and cracked; (2) pressure is reduced beyond the pressure regulating valve and before the effluent from the coil enters the vapor separator; and

(3) the effluent from the cracking coil is cooled by expansion due to reduction in pressure.

Respondent further cools or quenches this effluent by the introduction of a cooler stream of topped crude from the low pressure furnace as in Alexander and Greenstreet. Alexander's quench is a stream of cool crude oil used to reduce the temperature of the hot stream from the cracking coil (III, 1259). The heat of the cracked stream is used to distill the crude oil to produce a clean charging stock for the cracking coil. Greenstreet and respondent preheat this stream of quench oil, so that the heat contained in the cracked oil stream will distill an even greater amount of clean charging stock for the cracking coil (III, 1278; III, 1127).

The so-called "clean circulation" steps are disclosed in the prior art patents to Pielsticker, Hall, Ellis, and Alexander (*ante*, pp. 61-70; 73). Like them respondent continuously withdraws residue and returns reflux to the coil inlet.

Thus, the steps of respondent's process, *viz.*, (1) heating and cracking the oil in a coil, (2) reducing the pressure at the coil outlet and cooling the hot stream to stop the cracking thereof and to effect a separation of vapors from the heavy residue, (3) continuously withdrawing this residue and not returning it to the system, (4) distilling preheated topped crude in the separator to make *in situ* a clean charging stock for the cracking coil, (5) the further dephlegmation of the vapors in the bubble tower, and (6) the return of the insufficiently cracked condensate, together with the clean charging stock, to the coil inlet,—all are taught in the prior art, and all function in the respondent's operation precisely as in this art.

THE APPLICATION OF OTTO BEHIMER, FILED NOVEMBER 21, 1918, WHICH ISSUED INTO PATENT NO. 1,883,850, DISCLOSES ALL THE PROCESS STEPS OF THE DUBBS PATENT.

This application (DX. 696, VI, 2653 to 2669) was filed four months earlier than Dubbs's filing date of March 19, 1919, which is the earliest date of invention claimed for Dubbs. Behimer's application clearly stands as prior art to the subject matter of the Dubbs patent. In 1937 Universal acquired full licensing rights under Behimer patent No. 1,883,850 which issued on the application in question.

Opposite this page, we reproduce the drawing of the Behimer application as filed. A coil 1 is located in a furnace. In this coil, the oil is raised to a cracking temperature, but without permitting any substantial decomposition or cracking of the oil while in the coil. From the coil, the oil is discharged into the chamber 11 wherein cracking conditions of temperature and time are maintained, and wherein the oil is cracked and the carbon is deposited. The coil and drum are in open communication and maintained under the same pressure (as in Dubbs's B and C tubes). From the bottom of the chamber 11, residue is continuously withdrawn through the line 12, and is not returned to the system. From the top of the chamber, vapors pass off through the line 13 to the dephlegmator 15. In this dephlegmator, separation is effected between the vapors of the desired product, which pass off through the line 16 to the final condenser 18, and the insufficiently cracked material which is condensed as reflux and collected in the bottom of the dephlegmator, from whence it passes down the pipe 17 through the jet 7a, and thence to the inlet of the coil 1. All these steps, save the use of the jet 7a, are the same in Behimer and in Dubbs.

The District Court held that the jet pump 7a was inoperative because Behimer had been unable to make it work in commercial operations, and, hence, that the application failed as an anticipation of Dubbs, who, according to the District Court, taught as an inventive concept (Conclusion No. 11, VI, 3061), the hydrostatic return of reflux from the dephlegmator to the coil inlet. Respondent contends that this method of return is also taught in Behimer, and was anyway old in the art. But for this one feature it is conceded that Behimer anticipates Dubbs.

The Court of Appeals did not pass on the sufficiency of Behimer as an anticipation of Dubbs. This issue was not before the Third Circuit courts.

Behimer's Disclosure of Hydrostatic Return of Reflux Is Better Than Dubbs's Similar Disclosure.—As to the means for returning reflux from the separator, or dephlegmator, to the coil inlet, the Behimer application as filed says that (DX. 696, VI, 2659): "The separator is *preferably somewhat elevated* so as to give a considerable *head of liquid* in the pipe 17" which, together with the high pressure at which the oil in the charging line 7 passes the jet 7a, "insures that the condensate [reflux] shall be constantly drawn into the charging line and forced into the coil 1" where it mixes with the fresh charge, thus continuing the cycle. Thus, the Behimer application teaches the return of reflux to the coil inlet by hydrostatic head plus the action of the jet.

The comparable, *and only*, description of means for reflux return in the Dubbs patent in suit is contained in the following quotation from the specification of the patent (p. 1, lines 87, 93, VII, 3089):

> "• • • The portion of vapors condensed while passing through vapor lines E, manifold G and aerial

condenser G' *are automatically drained back* through these lines into drainage line F and from there through line F' enter into line J' and back into the heating tubes B. * * *"

Petitioner's expert, Dr. Brown, stated (II, 716-7) that Dubbs's teaching of hydrostatic return of reflux is contained in the word *"automatically"* in the above quoted sentence.

A comparison of the drawings of the Dubbs and Behimer patents shows that the elevation of the dephlegmator to cause hydrostatic pressure in the reflux return line to the coil inlet is about the same in each case.

Hydrostatic or Gravity Return of Reflux Was Well Known to the Prior Art, and Mechanical Skill Only Was Required to Increase, When Necessary, the Height of the Dephlegmator.—In the Burton process, reflux had always been returned by gravity or hydrostatic head from the dephlegmator to the still. The Humphreys patent No. 1,119,700 (DX. 784, VII, 3170) shows a pipe, used for this purpose, in which, as in the inclined pipes E of the Dubbs patent, the rising vapors flow countercurrent to the descending condensate or reflux. In the Humphreys device, as in the commercial Burton stills with which it was used, the condensate from the condenser flowed back by gravity to the still, and of course, no problem of frictional resistance existed.

Where, however, as in the Dubbs process, the reflux is returned by gravity to the inlet of a *coil*, in commercial operations the hydrostatic head had to be increased sufficiently to overcome the frictional resistance of the oil in the coil; and, of course, the longer the coil, the greater the resistance, and the greater the hydrostatic head that was needed to overcome it.

In the Dubbs Roxana No. 1 installation, with a hydrostatic head of only 12 feet (II, 602), the reflux and charging stock were passed through tubes only 240 feet in length.

In subsequent commercial installations of the so-called "Dubbs Cracking Process" a coil 1500 feet long was generally used. To provide sufficient hydrostatic pressure to overcome the considerable frictional resistance in a coil of that length, the dephlegmators were mounted on towers and set about 60 feet up from the ground.

Upon the perfection and adoption of hot oil pumps, hydrostatic return of reflux to the coil inlet was wholly abandoned by Universal, and coils of much greater length came to be used.

The Texas Company's Behimer process, with a hot oil pump, used a coil more than 3000 feet long in commercial operations (DX. 799, VI, 2829). With this length of coil and using hydrostatic head, the dephlegmator would have had to be elevated so high as to be impractical (Behimer, II, 918). Hence, The Texas Company never attempted to use hydrostatic return in commercial operations. Behimer testified (II, 937) that to him the use of gravity was evident, but that he was interested in positive return by mechanical means.

There is not a word in the Dubbs patent about the problem of overcoming frictional resistance in returning reflux to a coil inlet, or of solving the problem by elevation of the dephlegmator to the required height. Dubbs left the solving of this very simple problem entirely to the skill of the calling.

Mere Mechanical Skill Would Be Required to Substitute Other Means for Behimer's Jet.—This Behimer application was involved with the Dubbs patent, now in suit, in

Interference No. 49,355 (DX. 178, V, 2052) and Dubbs moved to dissolve on the ground of inoperativeness of the jet. The Motion was denied and the Patent Office stated (DX. 178, V, 2106):

> "If the jet pump is unsuitable for this purpose, it would seem to require no more than the skill of an expert mechanic to make provision for injecting the reflux condensate into the charging line by some other means."

Before either Dubbs or Behimer entered the field, Pielsticker had taught the return of reflux to the supply tank (*ante*, pp. 61-2), which is one of the methods of return taught in Dubbs, and which dispenses with the need of a hot oil pump or of a greatly elevated dephlegmator.

Before Either Dubbs or Behimer Filed, the Art Knew of a Successful Hot Oil Pump.—Furthermore, a pump suitable for returning hot reflux from the dephlegmator to the coil inlet was disclosed in the Thompson patent No. 1,250,050, which issued on December 11, 1917 (DX. 760, VII, 3254)—almost a year before Behimer filed his application on November 21, 1918.

The Thompson patent is directed to a solution of the difficulty of maintaining the packing in ordinary piston pumps when handling oil under pressure and at a temperature of 600° F. or more (VII, 3259, lines 12-21). The patent discloses a pump "to pump hot oil" (VII, 3259, lines 10, 11). The principle taught by Thompson is that of only permitting cool bodies of oil, confined to cooled passageways, to touch the moving parts of the pump, utilizing these cool bodies as extensions or continuations of the pistons. The cool bodies of oil, and not the pistons, contact the interconnected valve chambers and the very hot oil. Thus the reciprocating surges of cool bodies of oil continuously operate to suck in and discharge the hot oil from the

valve chambers, and provide a continuous flow of hot oil through the pump without permitting this hot oil to contact, or in any way affect, the pump and piston packing.

The Thompson Hot Oil Pump Immediately Solved the Problem of Reflux Return to a 3000 Foot Coil.—On March 23, 1921, Behimer's attention was called to the Dow surge pump, manufactured under the Thompson patent No. 1,250,050 (II, 927).

On April 9, 1921, Behimer wrote that this pump was just what he was looking for (II, 928) and on May 3, 1921, that it was "no doubt by far the best scheme suggested * * * for handling the backtrap * * * and is being made up with slight modification to be installed on Battery No. 14" (a commercial battery).

On May 21, 1921, the pump was installed (II, 928) and used on the apparatus of "experiment 11B," an experimental apparatus which Behimer had previously used to test different kinds of pumps.

By July, 1921 (at about the same time that the first Dubbs commercial units went into operation at the Roxana plant of the Royal Dutch Shell Group, and three years before the adoption of the Dubbs process by Standard of California), a large surge pump had been installed upon one of the commercial batteries* of the Port Arthur refinery and this pump satisfactorily handled and returned reflux to the inlet of the heating coil (II, 930, 931, 1018). Thereafter, as soon as such pumps, at a cost of $10,000.00 each (II, 1018), could be procured, the remaining twenty-three batteries at Port Arthur were similarly equipped (II, 969), The Texas Company having in the meantime negotiated a license under the Thompson patent (II, 969).

* In these batteries which were installed in 1920, space had been provided for a pump to return the reflux to the coil inlet when a satisfactory hot oil pump should be found (II, 923-4, 967-8).

SUMMARY OF ARGUMENT.

I.

The petitioner is guilty of unclean hands with respect to the equity here asserted. *Keystone Driller Co.* v. *General Excavator Co.*, 290 U. S. 240. That its unlawful and unethical actions did not damage either its opponent in the interference, or this respondent, is immaterial under the doctrine of *Morton Salt Co.* v. *G. S. Suppiger Co.*, 314 U. S. 488, 494.

II.

A. The claims of the Dubbs patent are not infringed because all of them are limited to a process where the oil is heated to a cracking temperature in tubes but without "substantial vaporization" of the oil in this heating step, and in respondent's operation very substantial vaporization of the oil takes place in this step.

"Vaporization" is a commonly used word of universally accepted meaning. It denotes the change of state from liquid to vapor. The definitions quoted by petitioner do not indicate any other meaning.

Petitioner contends that in the Dubbs patent "vaporization" has a special meaning to denote the "separation" or "liberation" of vapors from a liquid surface. If this unusual and special meaning had been what Dubbs intended, he should have made his own vocabulary. Dubbs's specification does not contain any definition of the terms of the art, but uses words in their accepted sense.

B. The true meaning of "vaporization" in Dubbs's claims is compelled by the file-wrapper history of the Dubbs patent.

Petitioner's view that the allowed claims are precisely the same in scope, with respect to the presence of generated vapors in the B tubes, as the original claims which were rejected and cancelled, renders the patent invalid under the rule in *Schriber-Schroth Co.* v. *Cleveland Trust Co.*, 311 U. S. 211.

The "substantial vaporization" prohibited in the allowed claims of the Dubbs patent must be the vapor generation which was present in the original claims and which was also present in the references on which Dubbs stood rejected before the final amendment, because (a) otherwise there would be no disclosure in the original application to support the allowed claims, and (b) because apart from this limitation, claims 4 and 5 of the Dubbs patent do not contain any element distinguishing them from that prior art, and the word "vaporization" cannot mean anything different in the other claims of the patent.

C. Under the rule in *Weber Electric Co.* v. *E. H. Freeman Electric Co.*, 256 U. S. 668, the meaning of the words "without substantial vaporization" used in the Dubbs patent in suit is confirmed by Dubbs's use of the same language in a similar limitation in the claims of a copending patent wherein he expressly teaches that the oil in the coil shall not be converted to any great amount into vapors.

D. Under petitioner's interpretation of the word "vaporization" as used in the Dubbs patent (1) velocity becomes an essential requirement of the process, and (2) a definite volumetric ratio of vapors to liquid, so as to maintain a foam as distinguished from a spray, is also required. Neither factor is taught or disclosed by Dubbs's specification and consequently, under such an interpretation, the Dubbs patent is invalid for lack of disclosure and for indefiniteness.

E. Giving the word "vaporization" its true meaning of vapor generation does not, as petitioner contends, make the Dubbs claims inconsistent with the conditions given in the illustrative run of the Dubbs patent. But in any event, petitioner's position is fundamentally unsound because it assumes that the claims must be construed to conform to the entire range of the illustration without exceeding the approximate pressure given therein, whereas under the authority of *Railroad Co.* v. *Mellon*, 104 U. S. 112, the claims which Dubbs narrowed by amendment cannot now be broadened by construction to conform to the scope of his unamended specification.

F. While the courts have frequently approved the right of a patentee to be his own lexicographer, they have always imposed the requirement that his definition must be clear and must be ascertained from the face of the patent. Dubbs used words in their accepted sense. The inferences which petitioner draws from certain passages in the Dubbs patent to establish a special meaning for the word "vaporization" do not meet the requirements of the patent statutes that the invention shall be set forth in full, clear, concise and exact terms, and be accurately defined in the claims. In any event, petitioner's inferences are unsound because every passage in the patent relied on by petitioner is entirely consistent with the use of "vaporization" in its accepted sense to denote the change of state from liquid to vapor.

G. The record does not support petitioner's contention that its interpretation of Dubbs's claims was recognized by those who took licenses under the Dubbs patent. There is no contemporaneous document showing either knowledge or use by these refiners (or by anyone else) of "vaporization" in petitioner's sense.

H. Commercial success of the so-called "Dubbs Cracking Process" cannot alter the meaning of the language used in the specification and claims of the Dubbs patent. Patent claims may not be construed to conform them to commercial practice, but commercial practice to be material and relevant must conform to the process defined by the claims. Furthermore, the "Dubbs Cracking Process" under which licenses were issued and royalties paid, comprised many hundred patents in addition to the patents in suit.

I. Infringement involves substantial identity between the process of the patent claims and the accused operation. Respondent also does not infringe Dubbs's claims because respondent's operation is fundamentally different from that of the patent.

J. The Third Circuit courts misunderstood the technology of cracking and the nature of the process of Dubbs's specification. It is not true, as those courts held, that pressure causes cracking or prevents vapors from being "liberated" from liquid, or that Dubbs releases pressure in the C tubes and uses those tubes merely to "liberate" vapors from a body of liquid.

III.

A. The Dubbs patent in suit is invalid. Every process step of this patent was disclosed in Behimer's application for patent filed four months before Dubbs filed his application. In the District Court's view hydrostatic or gravity return of reflux (1) was taught by Dubbs and not taught by Behimer, and (2) was a vital patentable feature. However, Behimer's disclosure of hydrostatic return is more explicit than the alleged similar disclosure in the Dubbs patent, and in any event, hydrostatic return was old and well known when both Behimer and

Dubbs entered the field, and could not constitute a patentable invention by either Dubbs or Behimer. It was also old to return the reflux to a supply tank where it would mingle with the charging oil, thus dispensing with both hydrostatic and pump return.

B. Entirely apart from gravity or supply tank return of reflux, the Behimer application negatives patentability in Dubbs in view of the availability, prior to the filing date of either Dubbs or Behimer, of the hot oil pump disclosed in the Thompson patent No. 1,250,050, which was put in use by The Texas Company in Behimer's process, within two months of learning of it. To incorporate the pump of Thompson's patent in Behimer's disclosure was nothing more than the skill of the art.

IV.

If construed as petitioner contends without regard to the basic teaching of a two-step cracking process and as being directed wholly to "clean circulation" in any type of cracking process, Dubbs's claims are invalid over prior art patents to Pielsticker, U. S. No. 477,153 and British No. 1308, to Ellis No. 1,396,999, and to Hall No. 1,175,910, each of which discloses "clean circulation."

None of these prior art patents was cited against the Dubbs patent in suit and therefore the latter has no presumption of validity against them. All of them were held to disclose "clean circulation" by the Tenth Circuit Court of Appeals in *Texas Company* v. *Anderson-Prichard Refining Corp.*, 122 F. (2d) 829.

All the steps of respondent's process were old in the art before Dubbs entered the field and function in its process as they did in the prior art. A patentee is not entitled to

a monopoly in assembling elements from the prior art when the combination of those elements does not result in any new and unexpected result.

V.

A. The only disclosure in the Egloff patent in suit is of a pressure distillation, two-step, liquid phase process, and this disclosure is inadequate.

B. The temperatures and pressures given in Egloff's specification constitute his only process teaching; they are not mere illustrations to be departed from at will.

C. Egloff's is not a coil cracking process like respondent's. Conditions appropriate for coil cracking are not disclosed in Egloff, and such an operation is expressly precluded by the file-wrapper history of the patent.

D. What petitioner claims to be the distinctive feature of Egloff is the step of returning the reflux to a coil distinct from that through which the charging oil flows, and there heating that oil to a cracking temperature prior to its entry into the cracking drum. On petitioner's own proofs this is a step backward, for petitioner claims an advantage in combining the reflux and charging stock in Dubbs.

E. Petitioner attributes to Egloff the disclosure of the step of preparing *in situ* a clean charging stock for a coil cracking operation, by distillation of a heavy charging oil in the expansion chamber. Such an idea is completely lacking in Egloff's disclosure. It would serve no purpose in Egloff's process where the streams from both furnaces are commingled and are cracked together in the expansion chamber. If given this construction, the

Egloff patent is invalid because anticipated by the Greenstreet patent, and because lacking invention over the Alexander patent.

F. The Egloff patent is invalid for lack of utility and disclosure. In Egloff's process there is no advantage in the separate heating of reflux and fresh charge, and he does not disclose conditions which would cause cracking.

G. The Egloff patent, if construed to read upon respondent's operation, is invalid because it would cover a combination of the steps of the prior art which function in that combination no differently than they did in the prior art. Neither the Greenstreet nor Alexander patent was cited by the Patent Office against Egloff's application, and his patent, therefore, does not have any presumption of validity against this prior art.

H. The claims of the Egloff patent must be construed in the light of the specification, and when thus construed are not infringed. The respondent's coil cracking, liquid-vapor phase, process, is not taught by Egloff's antithetical disclosure of keeping the oil in substantially liquid phase in the coils and conducting pressure distillation, liquid phase cracking in the chamber. The two processes are fundamentally different.

ARGUMENT.

I.

PETITIONER SHOULD BE BARRED FROM ALL EQUITABLE RELIEF BECAUSE IT IS NOT IN COURT WITH CLEAN HANDS.

At this time not much can be said about petitioner's conduct with respect to the decision of the Third Circuit Court of Appeals in the *Root* case. While it is true that a Special Master has found that Universal was guilty of corrupting a former circuit judge in order to obtain a favorable decision in that case, it is also true that as of this writing that matter is in an interlocutory stage, for the Court of Appeals has not yet rendered its opinion on Universal's objections and exceptions to the Master's Report. It is also true that the record now before this Court does not contain the facts as to petitioner's corrupt conduct in the *Root* case. The investigation in that case was ordered in November, 1941, and the proofs in the instant *Globe* case were closed, and the case was submitted to the District Court, by August, 1940. If the Third Circuit Court of Appeals should affirm the Master's Report and vacate its own decree in the *Root* case as having been void *ab initio* because obtained through bribery of a judge of the court which rendered it, then Universal will have no right in any court with respect to the Dubbs and Egloff patents. In the *Globe* case in the Seventh Circuit, Universal asserted the *Root* decree as *res judicata* and as a precedent—a position from which it withdrew only on the suggestion of the fraud

investigation to the Circuit Court of Appeals for the Third Circuit. It still asserts the decision as a precedent.

However, Universal's earlier corrupt conduct in the Dubbs-Behimer priority contest was discovered in time to adduce the proofs pertaining thereto in the record herein. It would seem clear that the attempt to obtain a false affidavit from Maurice Beyt, the bribery and attempted bribery of employees of The Texas Company, the making of a duplicate set of keys to Behimer's private filing cabinet, and, finally, the hiring away of Behimer from The Texas Company's employ by offering to pay him $225,000.00, and then causing him to repudiate his early work as a valid reduction to practice, all as set forth in the Statement of the Case (*ante*, pp. 9-18) constitute such conduct as requires, without more, the dismissal of the petitioner from a court of equity under the decision in *Keystone Driller Co.* v. *General Excavator Co.*, 290 U. S. 240. Petitioner does not controvert the facts. Its excuse in the courts below was that it was only "searching for the truth" in bribing The Texas Company's employees and in seeking to pilfer its files, and was merely seeking to add a good chemist to its staff in hiring Behimer. Neither excuse is convincing or furnishes any extenuation for such conduct. The District Court refused to dismiss the case because no one—neither The Texas Company nor respondent—had been injured. This was the very ground on which the District Court in the *Keystone Driller* case had refused to dismiss the bill of complaint, and, likewise, the very ground on which it was reversed by the Court of Appeals (62 F. (2d) 48), whose decision was affirmed by this Court. This Court has also said, in *Morton Salt Co.* v. *G. S. Suppiger Co.*, 314 U. S. 488, that (p. 494):

"It is the adverse effect upon the public interest of

> * * * the patentee's course of conduct, which disqualifies him * * * regardless of whether the particular defendant has suffered * * *."

The eventual failure of petitioner's efforts to steal its adversary's blueprints and drawings is also immaterial. As the New Jersey Chancery Court said in *Pendleton v. Gondolf*, 96 Atl. 47, 50:

> "But complainant's moral turpitude in the transaction was in no way lessened by the miscarriage of his plans."

The attempted justification that petitioner was merely searching for the truth is a casuistical argument of the same kind that was expressly repudiated in *The Stevens-Davis Co. v. Mather & Co.*, 230 Ill. App. 45, 124.

II.

NON-INFRINGEMENT OF THE DUBBS PATENT.

A. Dubbs's Claims Are Not Infringed Because of the Limitation to Heating the Oil "But Without Substantial Vaporization."—All the claims in suit of the Dubbs patent contain the limitation (inserted by amendment to obtain allowance after rejection) that the oil, in the first step, is to be brought to the cracking temperature (in a coil) but without permitting "substantial vaporization" of the oil in that first step. In respondent's operation "substantial vaporization" in the corresponding step unquestionably occurs, for 85% by weight of the liquid oil is converted into vapor, with the result that 95% by volume of the coil is occupied by vapor. The conclusion of noninfringement is, therefore, inescapable—and in fact conceded—unless "vaporization" in the Dubbs patent means something different to what it has always meant to everyone else.

As this Court has frequently said, the claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the "plain import" of its terms. *White* v. *Dunbar*, 119 U. S. 47, 52; *Howe Machine Company* v. *National Needle Company*, 134 U. S. 388, 394; *Minerals Separation, Limited et al.* v. *Butte & Superior Mining Company*, 250 U. S. 336, 347. The public should not be deprived of rights supposed to belong to it, without being clearly told what it is that limits these rights. *Merrill* v. *Yeomans*, 94 U. S. 568, 573.

The Seventh Circuit courts were not persuaded that Dubbs made a unique vocabulary in his patent, altering the "plain import" of the language used. The Third Circuit courts, swayed by a showing of great commercial success of something known as "The Dubbs Cracking Process" conformed the claims to the commercial operations, and, in effect, read the limitation out of the claims by holding that "vaporization" to Dubbs meant "liberation" of vapor from liquid. By this strained construction, those courts found infringement of claims limited to "without substantial vaporization" in *Root's* process where 58% by weight of the oil was vaporized in the coil. In very limited extenuation of the Third Circuit views (and assuming that the decision on appeal was not corrupt), it should be said that the defendant's counsel in the *Root* case did not offer in evidence, (because they did not think it necessary) any proof of the meaning of the word "vaporization." Such proof was very fully developed in the Seventh Circuit litigation.

"Vaporization" is a word familiar to every high-school boy or girl who has ever studied physics or chemistry. The

definitions contained in the Appendix to this Brief show that we are not here dealing with a term of unusual or doubtful meaning. "Vaporization" means the change of state from liquid to vapor. That change occurs when molecules are freed as vapor, either at a quiescent liquid surface, as in the evaporation of water from ponds or lakes, or in the bubbles formed in a boiling liquid. Vaporization always signifies the "liberation" or "passing off" of *molecules* as vapor (Cady, II, 805-6). In this sense, to convert into vapor is to pass off in vapor. Such molecular liberation, or "passing off" in vapor, occurs very substantially in respondent's coil. Doubtless for this reason the Seventh Circuit Court of Appeals said that Globe's operation did not infringe Dubbs's claims (VII, 3583) "whether we accept plaintiff's or defendant's definition of vaporization."

In attempting escape from this dilemma, petitioner's expert witness, Dr. George Granger Brown, of Michigan University, testified (III, 1363-4) that in the Dubbs patent

> "* * * liberation of vapors does not mean the separation of the vapors and their **passing off** as from a teakettle, nor does it mean the segregation of vapors from a liquid with the vapors passing on and leaving the liquid behind, **nor does it mean liberation of individual molecules so as to form bubbles of vapor within the liquid.** It means, just what it says, the liberation of vapors or the liberation or freeing of bubbles of vapor entrained in a liquid phase, so that these bubbles may coalesce to form a continuous vapor phase."

Dr. Brown expressed the opinion that where "vaporization" is used in the Dubbs patent (once in the specification, and repeatedly in the claims) it has this strange and narrow meaning. In its Brief before this Court, petitioner has completely repudiated its expert's views, for it says that "vaporization" in Dubbs's patent *does* mean to

"pass off in vapor." If petitioner cannot agree with its own expert witness, whom it summoned to the stand as a man skilled in the art, it is quite evident that, if the accepted meaning of "vaporization" be departed from, all certainty is at an end and the patent is invalid for indefiniteness.

B. The File-Wrapper History of the Dubbs Patent Excludes Petitioner's Meaning for "Vaporization." We have shown (*ante*, pp. 48-52) that the "vaporization" limitation in the claims was inserted after their rejection upon prior art references (Trumble and Edwards) which disclosed the very "vaporization" in the coil which is also present in respondent's coil, and that if "vaporization" in Dubbs's claims 4 and 5 be given petitioner's meaning those claims do not distinguish at all from the references, from which it follows that "vaporization" in all the claims means the same thing—*i. e.*, the formation of vapor from liquid. This file-wrapper history is, in itself, fatal to petitioner's theory of infringement. This Court held in *I. T. S. Rubber Company* v. *Essex Rubber Company*, 272 U. S. 429 (pp. 443-4), that a patentee is "estopped to claim • • • such a construction of his amended claim as would be equivalent" to his rejected claim. If petitioner's argument were adopted this is precisely what would follow.

It is true, as petitioner says (Br. p. 25) that "Throughout the prosecution, emphasis was consistently placed by the applicant upon the cycling of the reflux condensate free from carbon containing residue," but it is also true that Dubbs never got a patent on that concept. His claims were consistently rejected, and instead of appealing, he accepted a patent with claims distinguishing from the references on another ground, namely, "without substantial vaporization" in the heating step. That the Examiner may have

been wrong in holding that the references disclosed recycling of reflux uncontaminated by residue, is of course immaterial (*I. T. S. Rubber Company* v. *Essex Rubber Company*, 272 U. S. 429). If wrong, Dubbs's remedy was an appeal. But petitioner cannot now ask this Court to correct what petitioner believes (Br. p. 93) to have been the Examiner's error, and, in effect, to grant to Dubbs a patent with claims equivalent to those which were refused him by the Patent Office.

In *Schriber-Schroth* v. *Cleveland Trust Co.*, 311 U. S. 211, this Court pointed out that (pp. 218, 220-1):

> "It is a rule of patent construction consistently observed that a claim in a patent as allowed must be read and interpreted with reference to claims that have been cancelled or rejected, and the claims allowed cannot by construction be read to cover what was thus eliminated from the patent [citing cases]."

Dubbs's original claims 1 and 2 specified the presence of "generated vapors" in the heating step (in the B tubes) without indicating whether this "generation" was substantial or insubstantial (IV, 1515-6). These, and all other claims submitted prior to the final amendment, were rejected and either cancelled or rewritten. The allowed claims specified for the first time that the permissible vaporization (which must mean the "generated vapors" of the original claims) was to be not "substantial." But in petitioner's view (Br. pp. 24: 85-6) there is no more limit placed on the "generation" of vapors in the final, than in the original, claims. Hence, petitioner's argument destroys the validity of the allowed claims under the doctrine of the *Schriber-Schroth* case, for to petitioner they mean the same with respect to "vaporization" in the first step as the original claims which were cancelled.

Furthermore, it should be noted that if, as petitioner says, "vaporization" in the allowed claims means "vapor liberation" they are invalid because not supported by any disclosure in the application as filed. The only reference in that disclosure to the physical condition of the oil in the B tubes was the mention of "oil and generated vapors" in the two original claims, which, we agree, form part of the original disclosure. But that disclosure did not give any indication at all as to whether or not vapors were liberated, nor did it attempt to measure the amount of "vapors generated," in the B tubes. It would certainly not support claims referring to "liberated" vapors. Neither would it support claims having no "generated vapors" or all "generated vapors," in the first step. But it would support claims having any given proportion of "oil" to "generated vapors." It does support claims limited to "without substantial" vaporization, provided "vaporization" means the same thing as "vapors generated," and the applicant had the right to distinguish from the references such as Trumble, having an indefinite proportion of oil to generated vapors, by limiting his claims to a process where the "vaporization" *i. e.*, vapor generation, was insubstantial.

C. Dubbs Himself Used "Vaporization" in Its Accepted Sense.—It must be emphasized that the patentee, Carbon P. Dubbs, although living and available as a witness, and although in fact called by petitioner to testify on its behalf, on the "unclean hands" issue, was not called to testify as to his own invention nor to support petitioner's theory as to his use of the word "vaporization" in the patent in suit. This was doubtless due to the fact that in another patent, No. 1,686,654 (VII, 3468) Dubbs had used the word in its accepted sense, and that in the file wrapper of that

other patent (VII, 2976a) he had explained that the formation of vapors in a coil (*i. e.*, "vaporization" in the accepted sense) causes carbon to form, which, in turn, he thought would cause "trouble." The use of this other patent is sanctioned by this Court's decision in *Weber Electric Co.* v. *E. H. Freeman Electric Co.*, 256 U. S. 668, where a doubt as to the sense in which Weber had used the word "telescopic" in the patent in suit was resolved by reference to another and subsequently issued patent to the same patentee. This Court also approved (p. 678) the use by the Court of Appeals, for the same purpose, of dictionary definitions of the word used by the patentee.

D. Petitioner's Theory of Dubbs's Claims Renders Them Invalid for Uncertainty. Petitioner says (Br. p. 25) that the words "without substantial vaporization" were inserted "so that the claims would cover only a process wherein the B tube condition—no vapor separation—was present, and would exclude the condition which had caused the failure of the vapor phase processes" giving pages 656-7 of the record in support of the last statement. Petitioner elsewhere states (Br. pp. 109-110) that this "no vapor separation" condition is achieved, as was well known in the art, by flowing the vapor through the tubes at a sufficient velocity to keep the oil and vapors mixed up in the condition of a foamy mass.

Of course if this is what Dubbs had meant, he would not have hidden his meaning in such a phrase as "without substantial vaporization," nor would he have merely hinted at it in an obscure way by referring to a high pressure pump (which of course could be run fast or slow), or to the relative dimensions of the B and C tubes. If he had meant to teach a high velocity and a turbulent flow he could have found language just as appropriate as that used by Trumble

to teach these very things. There is not a word about velocity in the Dubbs patent, and the phrase "without substantial vaporization" does not mean "with a high velocity." As the District Court said (VI, 3049):

> "If • • • the number and length of the B tubes was such as to require forcing the oil there through at high velocity, and this velocity was necessary to prevent 'substantial vaporization' therein, the patent is wholly silent upon these critical factors of the invention."

It should be likewise noted that if "without substantial vaporization" means without permitting a condition where vapors would liberate themselves from a stream of liquid flowing along the bottom of the B tubes, the word "substantial" becomes meaningless. Vapors "liberate" themselves in this sense because being lighter they rise to the top of the liquid. But of course, they must all rise. An insubstantial number cannot remain behind while a substantial number rise and are "liberated."

There is a further insuperable obstacle to petitioner's assertion as to the meaning of the phrase "without substantial vaporization." As Howard Smith pointed out (III, 1094-5) you could vaporize the oil up to 100% in the coil without ever reaching a condition where vapors would be "separated" (in petitioner's sense) from the oil, provided you used sufficient velocity. But with 100% vapor in Dubbs's B tubes, it is at once apparent that, entirely apart from the crass absurdity of saying that "without substantial vaporization" is a condition satisfied even if all the oil be vaporized, there is no longer any distinction between Dubbs and the vapor phase processes, which of course causes the collapse of petitioner's argument that by the limiting amendment Dubbs was

distinguishing from these, rather than from mixed phase processes, such as respondent's.

Therefore petitioner and its expert stopped short of 100% vaporization, and arbitrarily pitched on 99.9%* vapors in the coil as being within Dubbs's teachings (III, 1364), and anything beyond that as being outside the reach of the claims—a permissible range of operation for a non-infringing process of less than one-tenth of one per cent.

The supposed justification for stopping short at 99.9% vapor is that up to that point the liquid phase is continuous—the stream is a "foam," which is a beneficial Dubbs condition—whereas beyond that point the vapor phase becomes continuous—the stream becomes a "spray," which is a harmful non-Dubbs condition. This means that somewhere in the transition from "foam" to "spray" we have, in Dr. Brown's, and, we suppose, in petitioner's view, the demarcation between the permitted insubstantial, and the prohibited substantial, "vaporization," of the claims. A "foam" is permitted; a substantial "spray" is prohibited. Again the word "substantial" becomes meaningless, for how could anyone tell whether or not, in the B tubes, a "spray" has become substantial rather than insubstantial? Petitioner and its learned expert were undisturbed by the fact that the Dubbs patent may be searched from beginning to end for any hint of such teachings.

To assert such theories is to proclaim the invalidity of the Dubbs patent. All certainty as to the boundaries of

* This is calculated from Dr. Brown's statement (III, 1364) that "liberation" of vapors begins "whenever the volume of the generated vapor exceeds a certain value times the volume of the liquid, and that value may be somewhere around 500 or 1000 to 1, regardless of the velocity of the material passing through the furnace tubes." 1000 parts vapor in 1001 total parts vapor and liquid equals 99.9% vapor.

the claims is at once destroyed. *General Electric Co.* v. *Wabash Appliance Corp.*, 304 U. S. 364, 369; *United Carbon Co.* v. *Binney & Smith Co.*, 317 U. S. 228, 232, 236. Petitioner's expert, as a man skilled in the art, conceded (II, 724) that a determination of when a foam will become a spray involves calculations; that he did not know "whether someone could have made those calculations as of 1919"; that he doubted that those skilled in the art in 1919 could "predict exactly where that break" from foam to spray "would come" without experiment (II, 699); that in his opinion velocities of one-half a foot or three-quarters of a foot per second would be the minimum to prevent liberation or separation of vapors from liquid and that (II, 767):

> "* * * at half a foot per second, certainly you are getting pretty close to it, and I don't know exactly where that will come in, but somewhere at those velocities, * * * you may get separation * * *."

In *Minerals Separation, Ltd.* v. *Butte & Superior Mining Company*, 250 U. S. 336, this Court said (p. 350):

> "To give such a construction to the patent would subordinate the clear description contained in it * * * to an implied and vague description and classification which would leave the whole subject again at large, to become a field for further experimentation * * *."

A disclosure which may be followed only after experimentation is too vague and indefinite to constitute invention. *Tyler* v. *Boston*, 74 U. S. 327; *Standard Brands, Inc.* v. *National Grain Yeast Corp.*, 308 U. S. 34, 37.

As a matter of fact, no experiments have been, or could be, devised to determine, in a closed pipe in a highly heated furnace, when turbulence of the stream substantially exists or does not exist, or when a "foam" breaks into a "spray."

The extreme uncertainty imparted to Dubbs's claims by petitioner's interpretation is glaringly illustrated by the

fact that in the *Root* case (78 F. (2d) 991 at p. 997) petitioner's then expert, Dr. Warren K. Lewis, testified that "without substantial vaporization" permitted both a "foam" and a "spray," whereas in the *Globe* case, petitioner's expert said that a "foam" was permitted, and a "spray," prohibited. When two experts, both testifying for the same client, one from Massachusetts Institute of Technology, and the other from Michigan University, cannot agree on what Dubbs meant, it would seem that no further proof is needed of the fallacy of their theories. Furthermore, it now appears that petitioner disagrees with its latest expert on the subject, for Dr. Brown said that "vaporization" did not mean to "pass off in vapor" and petitioner's Brief says that it does.

The conflict in views between petitioner's experts, and between petitioner and its expert Brown, in itself proclaims the invalidity of the Dubbs patent in petitioner's interpretation thereof. When experts disagree the man merely skilled in the art, would of course be hopelessly at sea.

The uncertainties and ambiguities, which arise only when the effort is made to impose upon Dubbs's claims a strained meaning for vaporization, suffice to make the claims invalid under the doctrine of *United Carbon Co.* v. *Binney & Smith Co.*, 317 U. S. 228, 232, 236.

What Judge Coxe termed his "*Argumentum ad Hominem*" in *Bracewell* v. *Passaic Print Works* (C. C. N. Y.), 107 Fed. 467, 481, is apposite:

> "If the patent be couched in language perspicuous and distinct, why is it necessary to present 2,000 pages of record and 350 pages of argument directed almost exclusively to the task of finding out what the patent means? The most learned chemists in the land differ radically and almost acrimoniously upon every vital

point and not infrequently those enlisted upon the same side are not in perfect accord. Were the patent taken bodily from Holy Writ no more antagonistic dogmas and warring theories could be deduced therefrom. Where so many accomplished specialists disagree, where so many propositions have been advanced tentatively and withdrawn, where reasons for certain phenomena are conceded to be wholly unknown, the ordinary layman may, perhaps, be pardoned for suggesting that a document which has brought about such a condition of affairs is not written in the clear language which the patent law requires. And yet the patent, if interpreted according to the ordinary meaning of its language, is plain enough."

E. Petitioner's Contention That the Word "Vaporization" in Dubbs's Claims Cannot Have Its Accepted Meaning in View of the Temperature and Pressure Conditions Given in the Illustrative Run.—Petitioner says (Brief pp. 72-9) that the limiting clause in Dubbs's claims, requiring that the heating step in the B tubes be accomplished "but without substantial vaporization" of the oil in the B tubes, must be given some meaning other than the obvious one, because, it says, the illustrative operating data given in the amendment to the specification are such that substantial vaporization, in the accepted meaning of the word "vaporization," is bound to occur in these tubes. When the illustration was added to the specification, the claims had not yet been limited by the clause requiring the oil to be heated in the coil "but without substantial vaporization."

Petitioner's argument is fundamentally unsound. It proceeds on the false assumption that if a patent specification does not give conditions within which may be practiced the invention defined by the claims as limited by the

carrying amendment, then the limitation must, in effect, be read out of the claims so as to make them conform to the specification. Such a doctrine would destroy the basic principle of patent law that the claims, and not the specification, measure the invention. The effect of any claim amendment could be nullified, if the specification were broad enough to support the claims without the amendment.

Were it true, as petitioner insists, that Dubbs's specification contained no disclosure of the process of the claims as amended, the only effect would be the total invalidity of the claims.

However, in the case at bar, if "vaporization" be given its accepted meaning there is adequate disclosure in the specification for practicing the process of the claims. The most that can be said is that if the operator rigidly limits himself to the 100 lbs. pressure (which the patent itself gives as merely approximate), the upper temperature range of the specification is inapplicable, and the operator must stay in the lower part of the range (III, 1088).

Therefore, petitioner must, and does, argue that the claims, although narrowed by amendment, must be broadened to fit the *entire temperature range* of the unamended specification. This Court has held that such a thing cannot be done.

In *Railroad Company* v. *Mellon*, 104 U. S. 112, this Court said (p. 118):

> "In this case the description of the appellee's invention is much broader than his claim. It seems quite clear from the present form of his specification, and from the fact that his application for a patent was twice rejected, that he was compelled by the Patent Office to narrow his claim to its present limits before the commissioner would grant him a patent. In doing this he neglected to amend the descriptive part of his speci-

fication.* **He cannot go beyond what he has claimed and insist that his patent covers something not claimed, merely because it is to be found in the descriptive part of the specification.''**

In *Libbey Glass Mfg. Co.* v. *Albert Pick Co., Inc.*, 63 F. (2d) 469, the Court of Appeals for the Seventh Circuit applied the doctrine of the *Railroad* case as follows (p. 471):

> ''• • • It is true that in patentee's application he states that his object is to provide a drinking glass of any of the numerous forms generally used. **The presence of that broad statement is due to the fact that patentee failed to amend it to consist with the claim which was finally allowed.** He cannot go beyond what he has claimed and insist that his patent covers something not claimed merely because it is to be found in the descriptive part of the specification. *Lehigh Valley Railroad Co.* v. *Mellon*, 104 U. S. 112, 26 L. Ed. 639. The claim in the patent is the measure of the invention, and, while the specification may be referred to to explain any ambiguity in the claim, it cannot be referred to for the purpose of expanding or changing the claim.''

In *Sky Writing Corporation of America* v. *Phillips Petroleum Co.*, 97 F. (2d) 218, the same Court said (p. 222):

> ''• • • Claim (i) of the application originally filed did not specify a separate preheating chamber. It was cancelled and amended claims were offered in which a preheating chamber was specified. However, the specifications were not amended. It seems apparent, therefore, that the patentee inserted the additional element in his combination claim in order to avoid

* This was precisely what happened in the prosecution of the application for the Dubbs patent. The illustrative run was inserted in September, 1919 (IV, 1520). When the final claims limited to "without substantial vaporization" in the B tubes were submitted in April, 1921, no further amendment was made of the specification (IV, 1536).

anticipation. The element thus added became a vital part of his claim and the **specifications describing the elements of the cancelled claims cannot be relied upon to enlarge the claim finally allowed, narrowed by the inclusion of an additional element.**''

Thus, Dubbs's failure to amend his specification by cancelling the inappropriate portion of the temperature range, or by suggesting a higher pressure, cannot compel a special meaning for the claim limitation (''without substantial vaporization'') in order to reconcile it with the now inappropriate and abandoned portion of the range.

Petitioner suggests (Br. p. 95) that the Examiner would have rejected the final claims as interpolating new matter had he not understood ''vaporization'' in petitioner's sense. This is stretching hypothesis too far. Rather, the Examiner would have understood that Dubbs was abandoning the upper part of his temperature range. The Examiner would never have troubled himself with working the necessary calculations from Dubbs's illustrative run to arrive at petitioner's strange meaning for vaporization, for he knew from Dubbs's copending application* that Dubbs used ''vaporization'' in its accepted sense.

In any event, petitioner's entire argument based on the ''illustrative run'' of the Dubbs patent is fallacious because it ignores the fact that the man skilled in the art, wishing to practice the process of the claims, could very easily prevent ''substantial vaporization'' in the coil, even at the high temperature, by merely increasing the pressure. Petitioner has no answer to this point.

* That the Examiner in charge of the application for Dubbs's patent in suit, knew of Dubbs's other applications is apparent from his remark (IV, 1519) that ''Care should be taken to maintain a proper line of division between this and applicant's numerous co-pending cases.''

F. To Support Its Meaning for "Vaporization" Petitioner Cannot Rely on Strained Inference from Words Used in the Patent; the Patentee Must Definitely Make His Own Vocabulary.—In its opinion in the instant case the Court of Appeals said (VII, 3580):

> "Plaintiff's right to define the terms used in its patent is clear. Its language and its meaning of the words selected, govern. • • • Equally clear is the rule that words will be given their ordinary and accustomed meaning unless it appears that the inventor used them differently. Moreover, the meaning which the inventor gives to his words can not be made to depend upon subsequent events, but should appear when the application is filed."

To the same effect are the Seventh Circuit decisions in *Dennis et al.* v. *Pitner et al.*, 106 F. (2d) 142, 148, *Chicago Steel Foundry Co.* v. *Burnside Steel Foundry Co.*, 132 F. (2d) 812, 814, *Advance Rumley Co.* v. *John Lauson Mfg. Co.*, 275 Fed. 249, 251, and *Chicago Wooden Ware Co. et al.* v. *Miller Ladder Co.*, 133 Fed. 541, 546. The fundamental principles underlying this rule have often found expression in the decisions of the courts in patent cases. Thus, it has been held:

That a patent is a bilateral instrument and accordingly is to be construed in accordance with rules governing the construction of contracts, *Doble Engineering Co.* v. *Leeds & Northrup Co.*, 134 F. (2d) 78, 84 (C. C. A. 1); *Texas Co.* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829, 840 (C. C. A. 10); *O. H. Jewell Filter Co.* v. *Jackson*, 140 F. 340, 343 (C. C. A. 8);

That language of doubtful meaning is to be taken most strongly against the one who used it, *Hookless Fastener Co.* v. *G. E. Prentice Mfg. Co.*, 68 F. (2d) 848, 851 (C. C. A. 2);

That words in a patent are to be interpreted by their own literal meaning and by the context in which they are used, *Godfrey L. Cabot, Inc.* v. *J. M. Huber Corporation*, 127 F. (2d) 805, 807 (C. C. A. 5), *Lakewood Engineering Co.* v. *Stein*, 8 F. (2d) 713, 715 (C. C. A. 6), *E. H. Freeman Electric Co.* v. *Weber Electric Co.*, 262 Fed. 769, 771-3 (C. C. A. 3), affirmed 256 U. S. 668, *Kintner et al.* v. *Atlantic Communication Co. et al.*, 240 Fed. 716, 721 (C. C. A. 2);

That words in a patent are to be given the meaning which the party using them (the patentee) should reasonably expect the other party (the public) to attach to them, *Mall Tool Co.* v. *Quaker Vibrators, Inc. et al.*, 30 F. Supp. 841, 842 (D. C. Pa.), *Evans et al.* v. *Hall Printing Press Co.*, 223 Fed. 539, 541 (C. C. A. 2) (See also Wigmore on Evidence, 3rd Ed.) Volume IX, Section 2466; "The Restatement of the Law of Contracts," Section 227; Holmes, "The Theory of Legal Interpretation," 12 Harv. L. Rev. 417);

That the intention of one party to a bilateral agreement that words should have an unusual sense cannot control over the usual and ordinary meaning of the words unless the unusual sense is clearly shown by the context in which they are used, *Daniels* v. *Permutit Co.* 44 F. Supp. 74, 78-9 (D. C. Del.) opinion by Circuit Judge Goodrich.

The application of these principles to the construction of patent claims is implicit in this Court's decision in *White* v. *Dunbar*, 119 U. S. 47, where it was said (p. 52):

> "• • • The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms."

Petitioner cannot point to any passage of the Dubbs patent which contains any definition of terms, much less a

definition of "vaporization." Dubbs evidently felt that such a definition would be wholly superfluous and we think he was entirely right.

In the absence of any special vocabulary in the patent petitioner resorts (Br. pp. 79-84) to strained inferences from the following sentences therein (VII, 3089-91):

(a) "C are the vaporizing tubes" (pat, p. 1, lines 53-4); "* * * Said oil is then passed into the tubes C which are only partially filled with the oil, and as the oil passes through these tubes, there is a liberation of vapors from same * * *" (pat. p. 1, lines 78-82);

From these passages petitioner argues (Br. pp. 79-80) that, in the patent, vapor liberation is used as a synonym for "vaporization."

(b) "* * * affording a vaporization space above the stream during the second stage of the travel thereof to said discharge point" (pat., p. 3, claim 5, lines 11-13);

From this passage petitioner argues (Br. p. 80) that claims 5 and 6 are meaningless unless "vaporization" means "liberation."

(c) "* * * the oil is heated to the cracking temperature but substantial vaporization prevented, and thence to an enlarged vapor chamber where vaporization takes place" (pat. p. 3, claim 7, lines 47-51);

From this passage, occurring in varying language in all the claims, petitioner argues (Br. p. 81) that what is inhibited in the B tubes is permitted in the C tubes, and "since vapor generation occurs in each, 'vaporization' means 'vapor liberation.'"

(d) "* * * removing the residue, after said vaporization * * *" (pat. p. 2, claim 1, lines 76-7; claim 2, lines 92-3);

From this passage petitioner argues (Br. p. 83) that residue is removed after vapors are liberated, and hence that "vaporization" means "liberation."

The petitioner's position is that the man skilled in the art, on reading these clauses in the Dubbs patent, would

infer that the limiting clause "without substantial vaporization" in the claims permits that the oil in the B tubes be substantially converted (up to 99.9%) into vapor, and prohibits only that vapors be substantially "separated" or "liberated" from the liquid.

We submit that no one in his senses would draw such an inference, and further that a resort to mere inference can never satisfy, in patent specifications and claims, the requirement of the Patent Statute (R. S. 4888, 35 U. S. C. A. § 33) that the "written description" be expressed in such "full, clear, concise, and exact terms as to enable any person skilled in the art" to make or use the invention. This would be so even though the inference be sound.

But petitioner's inference is not sound, as we now show.

(a) "C are the vaporizing tubes" is entirely consistent with the use of "vaporization" in its ordinary sense. In these tubes, much of the oil is vaporized—changed from liquid to vapor—as the result of cracking. Dubbs specifically states (pat. p. 1, lines 108-12, VII, 3089) that vapors are "generated" from the oil in the C tubes.

"Said oil is then passed into the tubes C which are only partially filled with the oil, and as the oil passes through these tubes, there is a liberation of vapors from same" is a passage (pat. p. 1, lines 78-82, VII, 3089) likewise entirely consistent with the use of "vaporization" in its accepted sense.

Petitioner's argument (Br. pp. 79-80) is that because the specification and claims both speak of "vaporization" in the C tubes and because the specification speaks (pat. p. 1, lines 78-82) of "a liberation of vapors" therein, therefore "vaporization" means "liberation." Even were "liberation" the only thing occurring in the C tubes, this sort of

deduction would not constitute the making of a distinct vocabulary. *But the main function of the C tubes is not to liberate vapors but to generate them as the result of cracking.* The "liberation" is merely incidental to this "generation." This, the specification expressly teaches. It says (pat. p. 1, lines 108-112):

> "* * * The per cent. of vapors *generated* from the oil as it passes through the tubes C will depend on the amount of heat acquired by said oil while passing through the 4" coils."

The specification also says (pat. p. 2, lines 40-4) "The heated oil then passes to the 10-inch coils C which are maintained about half full of oil and wherein vaporization takes place." Thus, it is far more reasonable to infer (if inference were permitted) that the "vaporization" of page 2 of the specification and of the claims, refers to the "vapors generated" in the passage above quoted—a meaning which "vaporization" has always had, and has now, —than that it refers to the "liberation" of vapors in the passage relied on by the petitioner—a meaning which was never heard of until someone in petitioner's camp concocted it in order to have a theory of infringement for the *Root* case. Petitioner's argument (Br. p. 72) that the above-quoted passage means that as a "per cent" of the vapors is generated in the C tubes, then a "balance"—100 minus that "per cent"—must be generated in the B tubes is wholly specious, because it proceeds on the false premise that Dubbs is here referring to the ratio between vapors generated in the B and C tubes, whereas the language used clearly shows that the ratio is of vapors generated to the unvaporized oil.

Petitioner also argues (Br. pp. 70-1) that the designation of the B tubes as "cracking tubes" (pat. p. 1, line 52,

VII, 3089) means that the cracking of the process takes place in these tubes and hence that substantial vaporization, in the ordinary meaning of the word, would inevitably result from this cracking, and hence again, that "vaporization" in the claims cannot mean this change of state from liquid to vapor, but must mean something else. This argument proceeds from the initial false premise that major cracking occurs in the B tubes—a premise which ignores the basic technology of Dubbs's process. It is clear from the patent, as we have previously shown (*ante*, pp. 28-35) and as the District Court found (Findings of Fact Nos. 10 and 11, VI, 3054-5), that cracking is merely initiated in the B tubes, and that the major part of the cracking occurs in the unheated or lightly fired C tubes, where the carbon resulting from liquid phase, deep cracking is deposited without harm or danger.

> (b) "* * * affording a vaporization space above the stream during the second stage of the travel thereof to said discharge point * * *."

This language from claim 5 is supposed to show that "vaporization," according to Dubbs, occurs "above the stream" and is therefore "liberation." However, "vaporization" is here used as an adjective, and not as a noun. It is not stated that "vaporization" occurs "above the stream," but that a "vaporization space" is there. This is merely an instance of Dubbs's carelessness in the use of language, as shown by the fact that he immediately corrects himself in a succeeding clause of the same claim where he refers to this same "vaporization space" as "said vapor space" (pat. p. 3, line 14)—a correction which he also observes in the ensuing claim 6 where again he speaks (pat. p. 3, lines 33-4) of "a vapor space" being provided "above the level of the oil wherein vaporization

takes place.'"* A patentee does not make his own vocabulary by a misstated word, when in the same sentence, as well as in another claim, he supplies the correction.

(c) "* * * the oil is heated to the cracking temperature but substantial vaporization prevented, and thence to an enlarged vapor chamber where vaporization takes place * * *."

Petitioner's argument (Br. p. 81) based on this, and similar language in all the claims in suit, can be summarily disposed of, for it assumes its premise, and is therefore of no validity. Petitioner says (Br. p. 81) that "Generation of vapor takes place both in tubes B and tubes C" and that "Hence the process referred to by the word 'vaporization' [in the claims] cannot be generation." This is no more than saying that vaporization occurs in the B tubes and therefore that vaporization cannot be prevented therein. Petitioner's further elaboration (Br. p. 81) that "What is inhibited in the B tubes is permitted in the C tubes" is fatal to its own conclusion, for vaporization in the normal sense of vapors generated is permitted in the C tubes, as the patent expressly states (pat. p. 1, lines 108-9, VII, 3089). Hence, the reasonable deduction from the language in question would be that it is this same generation of vapors which is prohibited from occurring *substantially* in the B tubes.

(d) "* * * removing the residue, after said vaporization * * *."

The inference here asserted (Br. p. 83) is that there is no residue until vapors have been "separated" from the liquid and, hence, that the man skilled in the art would

* Note, here, that Dubbs says that vaporization takes place, as it does, *in* the oil—not above it. The only other antecedent for the phrase "wherein vaporization takes place" is "a second conduit of greater diameter."

at once perceive from the language of this clause, occurring not in the specification, but in claims 1 and 2 of the patent, that, to Dubbs, "vaporization" meant something entirely different from what it meant to everyone else.

We submit that no one, reading this clause in Dubbs's claims, would hit on petitioner's meaning for "vaporization," even were the premise sound. But again, it is not sound. Residue is formed when part of the liquid is changed to vapor in the *formation* of vapor bubbles within the liquid body and *before* their escape therefrom. When part of the oil changes to the vapor state, the remainder is residue. The character of the residue is fixed "when the vapor bubbles form in the liquid" (Cady II, 809), not when they are "liberated" in petitioner's sense. On this point H. V. Smith testified (III, 1161):

> "The residue which is drawn off is the unvaporized portion of the oil, but the residue becomes a residue when the vapor is formed irrespective of whether the vapor is mixed with it or not."

Thus, it appears that every passage in the patent in suit relied on by petitioner to show that Dubbs did not mean "vaporization" when, in his claims, he said "without substantial vaporization," is entirely consistent with the use of "vaporization" in its accepted sense to denote the change of state from liquid to vapor. No one reading the patent objectively would ever dream that Dubbs was not using "vaporization" just as everyone else always uses it.

The requirements of the patent statutes, and the accuracy and precision of description essential to a valid grant, are not met by "vaguely and indefinitely" hinting at the invention or even by an "inverted method of description" *Western Electric Co.* v. *Ansonia Co.*, 114 U. S. 447. If the invention depends upon emphasis of one quality or characteristic

over another or on one meaning as distinguished from another, the statute requires that emphasis to be clearly revealed to the members of the public, who are entitled to know what invention is claimed. That is not accomplished either by naming a member having inherent antithetical properties or by ascribing to it one property when the other is meant. *Schriber-Schroth Co.* v. *Cleveland Trust Co.*, 305 U. S. 47, 57.

G. Universal's Licensees Never Knew or Recognized That the Process of the Dubbs Patent Permitted Substantial Vaporization in the Coil.—Petitioner argues (Brief, p. 90) that its licensees would never have taken licenses if they had understood that "vaporization" in Dubbs's claims meant vaporization in its accepted sense, because, in that event, they would also have known that operations with such vaporization in the coil would not have infringed Dubbs's claims.

This argument, even were it sound, proceeds from wholly false premises. It assumes that when the oil refining corporations accepted licenses from petitioner,* they knew that "vaporization" meant "vapor liberation"—an *ex post facto* deduction which the record does not support. Both Pyzel of the Royal Dutch Shell, and Hanna of Standard of California, in patents, applied for before and after their acceptance of licenses from petitioner, used "vaporization" in its accepted sense (*ante*, Statement of the Case, p. 42). There is no contemporaneous document showing either knowledge or use by them (or by anyone

* Pyzel took the license for the Roxana Royal Dutch Shell unit in December, 1919 (IV, 1734), when the Dubbs application for the patent was still pending, and long before the claims were amended (April, 1921, IV, 1536) to limit the process by requiring that the oil in the B tubes be raised to the cracking temperature "but without substantial vaporization."

else) of "vaporization" in petitioner's sense. Therefore, when they read Dubbs's patent in suit, they must have understood "vaporization" in its claims in the only sense in which they had ever used the word, as evidenced in their patents. *Loom Company* v. *Higgins*, 105 U. S. 580, 585.

When these licenses were taken out, liquid phase cracking processes were universally preferred and Pyzel and Hanna, of course, understood that the process of the Dubbs patent was within this then preferred classification. We learn this not from the testimony of these interested witnesses* at the trial, but from their *ante litem motam* statements in their patents.

The application for Hanna patent No. 1,449,226 (VII, 3394) was filed on August 29, 1921, before the Dubbs patent in suit issued on October 4, 1921. Hanna discloses a heating coil 16 and a vaporizing chamber 9. He says (pat. p. 2, lines 20-31):

> "• • • We take a charging stock, therefore, with a material range of boiling points; to wit, of not less than 200° F., and in the primary heating keep such stock under such a pressure as to at all times during such primary heating **prevent vaporization** of any material portion of the charging stock whereby substantially all the charging stock is at all times during such primary heating **retained in liquid form** and cracking thereof substantially avoided."

The primary heating is conducted in the coil 16. All the claims call for "primarily heating a moving body of petroleum oil • • • while subjecting the same to a pressure sufficient to maintain the same in substantially liquid form • • • ."

It is inconceivable that this leading refiner would have

* Royal Dutch Shell and Standard of California, when Pyzel and Hanna testified, owned or controlled practically all the stock in Universal Oil Products Company.

used this language in August, 1921, and that later he should have understood the clause in Dubbs's claims requiring that the oil be heated "but substantial vaporization prevented" to mean that this prevention permitted up to 99.9% of the tube to be filled with vapor.

As for Pyzel, he, like Dubbs, believed that vapor in the coil was detrimental to the process, although for a different reason. Thus, in his patent No. 1,597,821 (VII, 3438), filed June 25, 1924, in referring to the effect of getting vapor into the heating coil through the use of piston pumps, Pyzel says (pat. p. 2, lines 30-8, VII, 3440):

> "• • • This results in serious injury to the heating coil, since the presence of vapor in the heating coil prevents the heat delivered to the exterior thereof which is ordinarily rapidly absorbed in the liquid therein, from being promptly carried away and the use of piston pumps for this purpose has been previously found to be impractical and dangerous. • • •"

It is significant that Hanna got an opinion on the Dubbs '629 patent from his patent attorneys, Lyon and Lyon of Los Angeles (II, 557), and that neither this opinion nor Lyon's letter of July 3, 1924, was produced* when he testified (II, 579, 591). The loss or destruction of the opinion and correspondence is not easily understandable save for the inference that, if produced, they would have shown the utter fallacy of petitioner's contention that its licensees understood the Dubbs patent claims as petitioner wants them interpreted for the purpose of this suit.

Petitioner (Br. p. 88) relies upon Pyzel's statement (I, 508) that in the Independence operation which he saw:

> "There were vapors formed in the four inch tubes

* This non-production is inexplicable in view of petitioner's production of Hanna's other correspondence about the "Dubbs Process."

but the separation of the vapors from liquid which would constitute a vaporization took place in the ten inch tubes."

Universal characterizes this testimony as Pyzel's "observations." We submit that it is utterly impossible for anyone to "observe" the physical condition of oil in a four-inch steel tube inside a furnace at temperatures exceeding 700° F., and therefore that this testimony has no significance whatever. No tests were taken at Independence to determine the amount of vapors generated in the four-inch coil and the record is entirely lacking in any proof that in 1919 the boiling points of the multitudinous components of petroleum under 100 pounds pressure had been determined with sufficient accuracy to enable any sort of calculations to be made. Much more than an "elementary knowledge of physical laws" (Un. Br. p. 88) is needed to make such a computation. This is clearly shown by a contradiction in which Dr. Brown himself became involved. When testifying in the *Root* case he submitted a vapor pressure chart (DX. 776, VI, 2811) purporting to show the boiling range of a gas oil stock such as the defendant *Root* was charging to its process. In the instant case Brown testified (II, 778) that a pressure of about 2,000 pounds would be needed to prevent all vaporization in the Dubbs B tubes of the gas oil stock specified in the Dubbs illustrative run at the maximum temperature of 860° stated therein. However, Brown's own chart prepared in the *Root* case shows that a pressure of only 850 pounds at the temperature of 860°, would be sufficient to prevent all vaporization of an oil even more volatile (because containing more gasoline) than the gas oil specified in the illustration in the Dubbs patent (III, 1134). This discrepancy is incompatible with the supposedly elementary nature of the problem.

H. The Limited Process of Dubbs's Claims Cannot Be Broadened to Make It Conform to Commercial Operations or Demonstration Runs.—That the claims measure the invention has been held too often by this Court to require the citation of cases.

The monopoly granted to Dubbs was for the process defined by the claims of his patent. According to petitioner, this process was never practiced commercially, for petitioner says that in commercial installations of the "Dubbs Cracking Process" there was always substantial vaporization of the oil in the heating coil corresponding to the B tubes of the patent. From this it follows that petitioner's proofs of commercial success are so much surplusage in this record. To be relevant and material, such proofs must be of the invention of the claims. In *The Cuno Engineering Corporation* v. *The Automatic Devices Corporation*, 314 U. S. 84, in a special concurring opinion, Mr. Chief Justice Stone said (pp. 93-4):

> "The commercially successful structure for which respondent claims the protection of the Mead patent and which the court below thought satisfied a felt need, is not the structure described by Mead.
>
> • • • • • • •
>
> "The commercially exploited device because of the differences in its structure from that shown by Mead is the more compact and easily operated. Its utility as a lighter to be located on the dash of an automobile, which is said to be the merit of the Mead invention, is obvious. If the improvements resulting in such utility involved invention it is not the invention of Mead. If they exhibited only the skill of the art their success cannot be relied on to establish invention by Mead, who did not show or make them. The case is therefore not one for the application of the doctrine that commercial success or the manifest satisfaction of a felt need will turn the scale in favor of invention."

The point as applied to the question of infringement was forcibly expressed by Judge Learned Hand, in *Dorsey* v. *Pilot Electric Co.*, 32 Fed. (2d) 211, when, in speaking for the Court of Appeals for the Second Circuit, he said (p. 213):

> "The claims cannot, therefore, cover the defendant's apparatus, unless we are so far to generalize the disclosure as to include in the invention a quite different combination of parts; that is unless we omit from the system one of its necessary elements. Driggs suggested nothing of the kind, but by the language of his claims incorporated the specific organization which he disclosed. The putative commercial embodiments of the patent, Exhibits 8 and 9, are not made in accordance with its disclosure at all. Like the defendant's, they are units which subsist independently of the shaft. **The patent can gain nothing from their popularity, unless the very question at issue is begged.**"

It cannot be the law that an applicant for patent, upon obtaining allowance of his claims through inserting therein a narrowing limitation, may disregard this limitation in commercial operations purporting to embody the invention, achieve tremendous commercial success of the process not thus limited, and then invoke this success as a reason for misconstruing or ignoring the claim limitation. Under such a rule, the patent system would be completely destroyed. The claims would no longer measure the invention; *the supposed invention, if successful enough in commercial operations, would measure the claims.* This was the heresy of the Third Circuit courts in the *Root* case.

Petitioner also stresses (Br. p. 27) the asserted fact that in a demonstration run of the so-called Dubbs process at Independence, Kansas, in the summer of 1919, there was generation of vapors in the B tubes. The fact is without significance. At that time the Dubbs patent had not issued,

and no claims had as yet been submitted limiting the process to one wherein the heating step is accomplished but "substantial vaporization prevented."

Furthermore, it should be recalled that the "Dubbs Cracking Process," under which licenses were taken, did not embody the '629 patent alone, but literally hundreds of other patents and applications for patents. For instance, in January, 1924, petitioner advertised (DX. 592, V. 2402):

> "The Dubbs Cracking Process is based on and protected by more than 1200 issued patents and pending patent applications."

Universal licensed Mid-Continent Petroleum Corporation (PX. 569, II, 595) under *more than four hundred patents.* This Court pointed out in *John E. Thropp's Sons Company* v. *Seiberling*, 264 U. S. 320, 329, that licenses granted under several patents cannot be viewed as tributes to one only and that commercial success is often due to the prestige of a great company, and to the desire of the infringer to purchase his peace.

Petitioner strenuously urges (Br. pp. 103-105) that the alleged revolutionary character of the Dubbs patent should resolve any doubt as to which construction of the Dubbs claims should be adopted.

Petitioner ignores completely the position in the art ascribed to the Dubbs patent by the Court of Appeals, that is, that (VII, 3582) "the invention was in the nature of an improvement" in a field that "was well occupied." Thus, where the invention is a narrow one, the applicable rule is that the claims should be construed strictly with regard to the prior art and to alleged infringing devices. *Kokomo Fence Machine Co.* v. *Kitselman*, 189 U. S. 8; *Cimiotti Unhairing Co.* v. *American Fur Refining Co.*, 198 U. S. 399.

But even were the Dubbs patent revolutionary, petitioner's pretensions on its behalf far transcend the limits of the rule of *McClain* v. *Ortmayer*, 141 U. S. 419, 425, and *Smith* v. *Snow*, 294 U. S. 1, 14, for the construction which petitioner would have this Court adopt so expands Dubbs's claims as to do violence to the language chosen by Dubbs to express his invention. The rule of which petitioner seeks in part to avail itself, was stated in its entirety by this Court in *McClain* v. *Ortmayer*, as follows:

> "It is true that, in a case of doubt, where the claim is fairly susceptible of two constructions, that one will be adopted which will preserve to the patentee his actual invention; **but if the language of the specification and claim shows clearly what he desired to secure as a monopoly, nothing can be held to be an infringement which does not fall within the terms the patentee has himself chosen to express his invention.**"

Thus the inquiry is returned to a determination of the meaning of the language employed in the claims. This meaning must be arrived at independently of the putative use of the patented invention.

It should be remembered that the doctrine of *McClain* v. *Ortmayer* and *Smith* v. *Snow*, invoked by petitioner, is a rule of construction and not of reconstruction. Nowhere in the field of patent law will any authority or justification be found for carrying the rules favoring liberality in construction into the boundless area of reformation.

Marconi Wireless Co. v. *U. S.*, 320 U. S. 1, 34, does not, as petitioner seems to contend (Br., p. 89), modify the requirement of the patent statutes that the disclosure of an invention must be by "full, clear, concise and exact" description made in the application for patent. Nor does it permit reading limitations out of claims by conforming them to experimental runs. From the opinion in that case

immediately preceding petitioner's quotation, it appears that Stone's original application (relied upon to anticipate Marconi) sufficiently disclosed the "desirability that the antenna circuits in transmitter and receiver be resonant to the same frequency as the closed circuits" and that the 1902 amendments merely made "explicit what was already implicit." The question in issue was, of course, not the scope of Stone's claims, but what Stone, as an anticipating reference, "disclosed in the specification and made known to the world." See also *Minerals Separation* v. *Magma Co.*, 280 U. S. 400, 402; *Alexander Milburn Co.* v. *Davis-Bournonville Co.*, 270 U. S. 390. This Court did not use Stone's letters to Baker, as petitioner asks this Court to use Dubb's Independence operation, to alter the plain meaning of a word used in the claim limitation, and thus to broaden the scope of the claims. *Marconi Wireless Co.* v. *U. S.* did not depart from the principle that "the patent monopoly does not extend beyond the invention described and explained as the statute requires." *Schriber-Schroth Co.* v. *Cleveland Trust Co., et al.*, 305 U. S. 47, 57.

I. Respondent's Process Also Does Not Infringe the Process of the Dubbs Patent Because the Two Are Fundamentally Different.—In *Westinghouse* v. *Boyden Power Brake Co.*, 170 U. S. 537, this Court announced that infringement depends not on claim language alone, but also on identity of principle between the patented invention and the accused process or device. Quoting from the *Westinghouse* case (p. 568):

> "The patentee may bring the defendant within the letter of his claims, but if the latter has so far changed the principle of the device that the claims of the patent, literally construed, have ceased to represent his actual invention, he is as little subject to be adjudged

an infringer as one who has violated the letter of a statute has to be convicted, when he has done nothing in conflict with its spirit and intent. 'An infringement,' says Mr. Justice Grier in *Burr* v. *Duryee*, 1 Wall. 531, 572, 'involves substantial identity, whether that identity be described by the terms, "same principle," same "modus operandi," or any other * * *.'"

There is no "substantial identity" between the process of the Dubbs patent and respondent's operation. In fact the two are antithetical as appears from the following contrasting tabulation:

Process of Dubbs's Patent.	**Respondent's Operation.**
1. Heating the oil to a cracking temperature in the liquid phase in the B tubes, where cracking is initiated.	1. Heating the oil to progressively increasing cracking temperatures and doing substantially all the cracking in the mixed phase in the coil.
2. Doing the major part of the cracking of the process in the unheated or mildly heated 10-inch C tubes, this being accomplished	2. Stopping the cracking operation at the coil outlet so that practically no cracking occurs beyond the pressure reducing valve, this being accomplished
(a) by maintaining full still pressure on the C tubes, these being in open communication with the B tubes;	(a) by reducing pressure in the vapor separator to 26 lbs. by means of the pressure regulating valve;
(b) by maintaining in the C tubes the cracking temperature which the oil attained in the B tubes;	(b) by reducing the temperature of the oil by cooling it through expansion and by the introduction of cooler quench oil from the low temperature furnace;
(c) by providing in the C tubes the necessary time factor to permit the preacquired temperature of the oil to become effective to cause cracking.	(c) by cutting the time factor in the vapor separator to a minimum, so as to prevent cracking therein.

3. Dealing with the carbon problem by the "fireless cooker" principle, so that carbon may be formed and deposited with complete safety in the unheated or lightly fired C tubes in amounts only limited by their capacity, thereby making it possible to feed even the dirtiest carbon-laden stocks to the system.	3. Dealing with the carbon problem by feeding only clean stock to the coil, and stopping the cracking therein at the point where carbon would begin to form, and by eliminating cracking from the vapor separator so that very little carbon is deposited in the separator, or anywhere else in the system.
4. Major cracking in the liquid phase in the C tubes, vapors formed therein as the result of cracking not having sufficient time in which to crack, for they leave these tubes substantially as soon as formed.	4. Cracking in the mile-long coil in mixed liquid and vapor phase, vapors formed in the coil being unable to escape therefrom and being, therefore, together with the liquid, subjected to cracking conditions of temperature and time throughout the length of the coil.
5. Using comparatively low cracking temperatures and long time factor, thereby making the type of gasoline preferred in the early days of cracking.	5. Using high cracking temperatures and a short time factor, thereby making the type of gasoline which was undesired in the early days of cracking but which today is the preferred product due to its anti-knock qualities.

These points of difference are not mere superficial features, but are, rather, the very essentials of the respective processes.

The fact is that the only process steps common to both Dubbs and respondent are those of withdrawing residue and returning reflux to the coil inlet—what petitioner calls "clean circulation." Of these, the residue withdrawal step is admittedly old. The Patent Office refused Dubbs a

patent with residue withdrawal and non-return as the alleged novel feature of his invention (IV, 1535). This leaves petitioner in the position where it must, and does, contend that the heart of Dubbs's invention, whereby he solved the carbon problem, was the step of immediately returning reflux to the coil inlet or supply tank instead of to the cracking drum. This step, besides being also old, had nothing to do with the solution of the carbon problem to which the Dubbs patent is directed.

Whether reflux be returned to the B tubes or to the C tubes makes no difference save as it affects Dubbs's basic two-step process which, in itself, constitutes Dubbs's solution of the carbon problem. If reflux went back to the C tubes, it would tend to cool the oil therein and hamper Dubbs's purpose of maintaining this oil at the cracking temperature which it had acquired in the B tubes, but the function of the C tubes as the safe repository of carbon would be unaffected. Cracking stills of The Texas Company operated just about as well with reflux going back to the drums as with reflux going back to the coil inlet (II, 968-9).

In the respondent's operation, the distinctive benefit of reflux return to the coil inlet in the Dubbs patent is entirely lacking. By return of reflux to its coil, respondent is not seeking to prevent cooling in its vapor separator, for it deliberately effects cooling there. The only advantages gained by respondent through returning reflux immediately is the saving of the heat contained in the reflux which would be lost were it stored and charged at another time, and the saving of equipment which would have to be used for this storage (Smith, III, 1131-2).

J. Dubbs's Claims Reflect the Two-Step Heating and Cracking Process of the Specification.—Every claim in suit

of the Dubbs patent calls for a first step where the oil is heated to a cracking temperature but without permitting substantial vaporization of the oil, and for a second step where vaporization occurs. None of the claims calls for cracking the oil in the first step, or B tubes.

Even disregarding the limitation against substantial vaporization, it is apparent that the claims describe in apt language the specification teaching of a two-step cracking process.

Cracking is a function, not of temperature alone, but of temperature and time, and as this was well understood in the art long before Dubbs entered the field, the man skilled in the art would know that a call for heating the oil to a cracking temperature is not a call for cracking the oil because "the application of temperature alone" will not bring about cracking (H. V. Smith, III, 1060).

Dubbs's claims express the second, or cracking, step in terms of "vaporization," and, as we have shown (*ante*, pp. 30-1) the vaporization which occurs in the second step (C tubes) is vaporization resulting entirely from cracking. Therefore, the Dubbs two-step cracking process, which solved the carbon problem, and which respondent does not use, is reflected in the claims.

In the Tenth Circuit Court of Appeals' decision in *Texas Co.* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829, in passing upon the question of infringement of the Behimer patent, No. 1,883,850 (whose application was involved with the Dubbs patent in Interference No. 49,355), the Court held that Behimer's claims must be interpreted in the light of his specification, which, like Dubbs's, teaches a two-step "fireless cooker" cracking process, and that when thus construed, Behimer's claims

were not infringed by Anderson-Prichard's Winkler-Koch coil cracking process.

In the *Anderson-Prichard* case, the Court said, speaking through Judge Phillips (p. 841):

> "Behimer solved the carbon problem by inhibiting cracking in the coil, and effecting the cracking in a drum to which substantially no external heat is applied. * * *
>
> "**So construed, the alleged infringing process is clearly distinguishable.** It cracks in the coil, not in the drum. It is a vapor liquid phase process with a short time factor, whereas Behimer's is a liquid phase high pressure, long time factor process. * * * It releases the pressure at the exit from the furnace and prevents cracking in the drum or vapor separator, whereas, in Behimer's, the same pressure is maintained in the coil and drum and substantially all the cracking takes place after the oil reaches the drum. Behimer's process is designed to handle heavy oil, whereas the alleged infringing process can use only a clean charging stock. In Behimer's, the carbon problem is solved by effecting the cracking in the drum to which no substantial amount of external heat is applied. In the alleged infringing process, the cracking takes place in the coil to which external heat is applied and the carbon problem is solved by methods distinct from Behimer. Behimer's process produces a sweet product, low in unsaturates, like natural gasoline, while the alleged infringing process produces a yellow colored, foul smelling, unsaturated product."

K. The Third Circuit Courts in the Root Case Erred in Their Interpretation of Dubbs's Specification.—District Judge Nields undertook to enumerate the features disclosed in the Dubbs patent (6 Fed. Supp. 763, at page 766), and in doing so he interpolated a description of the condition of the hydrocarbons in the B tubes which is wholly lacking in the patent specification. The patent nowhere

states that in the B tubes "cracking occurs without substantial separation of the generated vapors from the liquid," nor does it state that "the vapors generated in the cracking tubes are homogeneously dispersed in the liquid oil and pass with the liquid as a stream through the tubes whereby carbon deposits are prevented." The patent specification says nothing whatever about the condition of the hydrocarbons, whether vapor, or liquid, or both, in the B tubes, nor does it claim that the passage of vapors homogeneously dispersed in the liquid oil prevents carbon deposits. Subsequently in the opinion, the District Court fell into further grave error. It said (p. 767) "the primary function of the C tubes is to separate the vapor from the liquid." This, as we have shown, is directly contrary to the fact. In the *Globe* case petitioner's expert, Dr. Brown, admitted (II, 750-1) that if the function of the C tubes were merely to liberate vapors formed in the B tubes it would be entirely unnecessary to provide, as Dubbs does, four C tubes, because any vapors formed in the B tubes would liberate themselves within a few feet, or at most at the end of the first C tube.

Judge Nields also stated (p. 767) that when Dubbs called the C tubes vaporizing tubes he "had this separation primarily in mind." To vaporize means to change from liquid to vapor. Hence, if any significance is to be attributed to this nomenclature, it would indicate that Dubbs had primarily in mind the generation of vapors in the C tubes when he called them vaporizing tubes.

In support of his belief that the major cracking of the process occurred in the B tubes, and hence that substantial vaporization also occurred therein, Judge Nields relied upon the passage in the specification of the Dubbs patent begin-

ning on page 1, lines 75-83. District Judge Holly, in the Seventh Circuit, in considering this same passage was careful to point out (VI, 3048) that "It will be noted that he [Dubbs] does not say the desired amount of cracking occurs in the B tubes and from the whole patent it is clear that what he is attempting is to impart to the oil in the B tubes the heat that will cause it to crack in the C tubes."

Referring to the temperature range of 750° to 860° given in Dubbs's illustration, Judge Nields said (p. 767):

> "• • • This range of heat in the cracking tubes is cracking temperature and at the stated pressure would inevitably result in cracking."

This sentence is meaningless, because the pressure would have nothing whatever to do with whether the cracking occurred in the B tubes. The same error appears on page 264 of the opinion, where Judge Nields says that " 'Cracking' is the decomposition by heat and pressure." It is time rather than pressure which, with heat, causes cracking. The Court's failure to understand the time factor contributed to its misconception of the nature of the Dubbs process.

In the Third Circuit Court of Appeals, misconceptions of the technology of Dubbs's specification are equally manifest. Thus, the Court said (78 F. (2d) 991, at p. 997):

> "The art well knew that the cracking of oil by heat generates vapor in the B tubes, but pressure keeps it from separating from the liquid, and both the vapor and the liquid as a mixture rush on with great velocity into the C tubes which are only partially filled with the liquid, and, the pressure being released, the vapors separate from the liquid and thus vaporization, liberation of vapor, takes place."

Of course, the art knew no such thing. On the contrary, it "well knew" that pressure has nothing to do with keep-

ing vapor bubbles from separating from the liquid. If the liquid is sufficiently quiescent the bubbles will separate themselves from the liquid, no matter what the pressure, simply because they are lighter than the liquid and obey the force of gravity. From this it follows that release of pressure would likewise have nothing whatsoever to do with the separation or liberation of vapors. Furthermore, the Court was wholly in error in believing that pressure is released in the C tubes of the Dubbs patent. An outstanding feature of that patent, is that the C tubes are in open communication with the B tubes and that there is no release of pressure on the oil as it passes from the B to the C tubes. The purpose of maintaining the full still pressure on the C tubes is to prevent the oil from vaporizing and escaping from these tubes before it can be subjected to a sufficient time factor to be cracked in the liquid phase.

The Court of Appeals also relied (p. 998) on Dubbs's statement on page 2, lines 40-43 of the patent, that when the oil (the Court substitutes the word "mixture" for the patentee's use of the word "oil") enters the half-full C tubes, "vaporization takes place." The Court then makes the argument that because the patent also states that vapors pass up through the D tubes and that on page 1, lines 78-84, the patentee says that there is a liberation of vapors in the C tubes, it follows that the word "vaporization," occurring on page 2, line 44 of the patent, necessarily refers to the "liberation" of page 1. The Court wholly disregarded the fact that Dubbs also expressly describes (p. 1, lines 108-12, VII, 3089) the generation of vapors from the oil as it passes through the C tubes, and that it is more reasonable to assume that the "vaporization" of page 2 refers to the "generation of vapors" of page 1—a meaning which

"vaporization" has always had—than that it refers to the liberation which occurs in the C tubes—a meaning which it never had.

The Court's carelessness in dealing with the Dubbs patent is well exemplified by its statement that (p. 993) "Dubbs thus secures what the patent calls a continuous 'clean circulation' free from carbon-producing residuum." The words "clean circulation" do not appear in the patent. So far as the record shows this phrase was never used by anyone until someone—probably a lawyer—thought of it in the course of the interferences five or six years after the Dubbs patent was filed.

The Court's uncertainty as to its own finding of infringement of the Dubbs patent, is apparent from its astounding statement that

> "Even if the appellant has not infringed the Dubbs patent, it has infringed the Egloff patent * * *."

III.

INVALIDITY OF THE DUBBS PATENT

A. Behimer's 1918 Application Disclosed All the Process Steps of the Dubbs Patent.—The issue of invalidity of Dubbs over Behimer was not before the Third Circuit Courts. In the Seventh Circuit, District Judge Holly held (Opinion, VI, 3043) that "Behimer conceived the idea of clean circulation and the advantage which would result therefrom earlier than did Dubbs."

But Judge Holly also held (Conclusion 10, VI, 3061) that Behimer's application did not invalidate the Dubbs patent because Behimer did not have an operative method

of returning reflux to the heating coil. Judge Holly said (Opinion, VI, 3043):

> "It did not occur to him [Behimer], as it did to Dubbs, to return the reflux by force of gravity."

The District Court's Conclusion of Law No. 11 is as follows (VI, 3061):

> "11. The method of returning reflux by hydrostatic head was not the exercise of mere mechanical skill but constituted patentable novelty."

The Court of Appeals chose not to pass on the Behimer defense.

In the District Court's view, (1) *hydrostatic* return of reflux was taught by Dubbs, and not by Behimer, (2) such return was a vital, patentable feature. But we have shown in the Statement of Facts (*ante*, pp. 78-9) that Behimer's disclosure of hydrostatic return is at least as good as, if not better than, the similar alleged disclosure in the Dubbs patent.

Obviously, therefore, the District Court was either right about the Dubbs patent and wrong about the Behimer application, or *vice-versa*. He could not have been right about both.

In any event, gravity or hydrostatic return of reflux was old and well known at the time when Behimer and Dubbs entered the field. It had been extensively used in returning reflux to cracking drums, and mere mechanical skill was involved in increasing the hydrostatic head by raising the dephlegmator higher when returning reflux to coils. Nor has petitioner ever had an answer to the use of the supply tank taught in Pielsticker, and disclosed in Dubbs, which dispenses with both hydrostatic and pump return.

This Court said in *Carnegie Steel Co.* v. *Cambria Iron Co.*, 185 U. S. 403:

> "That which is common and well known is as if it were written out in the patent and delineated in the drawing."

It follows that the only obstacle that has ever been asserted to the anticipatory effect of Behimer is without validity in fact and in law.

B. Behimer's Application Constitutes Prior Art Which, in View Also of the Availability of a Hot Oil Pump Prior to Dubbs's Filing Date, Negatives Patentability in Dubbs.— This Court has held in many cases,* (1) that an earlier filed application is prior art to one subsequently filed and (2) that a prior art disclosure may be supplemented by mere mechanical skill.† Therefore, as the art knew (although Behimer and The Texas Company had no actual knowledge thereof until 1921) of an operable hot oil pump disclosed in the Thompson patent No. 1,250,050 (VII, 3254) which issued December 11, 1917, there was nothing left for Dubbs to file a patent application on. To incorporate the pump of Thompson's patent in Behimer's disclosure was nothing more than the skill of the art,— *The Cuno Engineering Corp.* v. *Automatic Devices Corp.*, 314 U. S. 84, at p. 89.

As the Court of Appeals for the Tenth Circuit said on this precise point in the case of *Texas Co.* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829, 842:

> "The use of a pump to force charging stock into

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* *Detrola Corp.* v. *Hazeltine Corp.*, 313 U. S. 259, 269; *The Cuno Engineering Corp.* v. *The Automatic Devices Corp.*, 314 U. S. 84; *Alexander Milburn Co.* v. *Davis-Bournonville*, 270 U. S. 390, 401.

† *Pickering* v. *McCullough*, 104 U. S. 310, 319; *Expanded Metal Co.* v. *Bradford*, 214 U. S. 366, 380.

the cycle was, of course, well known. Up to the time that the hot oil pump became available the hot reflux in the Behimer process was returned to the drum for further cracking. Being of a lower temperature than the oil in the drum it tended to lower the temperature in the drum. To conceive the idea of returning it to the charging stream by means of the hot oil pump, when such pump became available, so it would pass through the coil and again be raised to a cracking temperature did not rise to the dignity of invention. Rather, it was merely the exercise of the mechanical skill of one trained in the art."

In the case at bar, the District Court held (Finding of Fact 26, VI, 3058) that The Texas Company "did not use the Thompson pump, but worked out a pump of its own device, and this pump worked satisfactorily." We respectfully submit that this Finding is not supported by the Record. The Texas Company appropriated the entire principle (II, 973) of the Thompson surge pump, and took a license under the Thompson patent. Such modifications as it made (See DX. 730, VI, 2723) were in immaterial details, such as changing the vertical surge lines to horizontal lines (II, 973) and installing a gooseneck to overcome vibration of these lines (II, 974). That mere mechanical skill was required to utilize the principle of the Thompson patent, is conclusively shown by the admitted fact that within two months of the time when Behimer's attention was called to the Thompson patent, a Thompson type pump was successfully operating on a Behimer still.

Publication of the Thompson patent was constructive notice to all the world. In *Mast, Foos & Co.* v. *Stover Mfg. Co.*, 177 U. S. 485, 493, this Court held that an applicant for patent "is chargeable with a knowledge of all pre-existing devices."

District Judge Holly held (Opinion, VI, 3045) that The Texas Company caused Behimer to file his application so as to "have it on record as an anticipation to be used against some one who might design a workable process." The Texas Company's motive in filing cannot affect the public, and is wholly immaterial. The Texas Company is not a party to this suit, nor is the validity of the Behimer patent *as against the public* an issue in the case at bar.

IV.

INVALIDITY OF DUBBS'S CLAIMS IF READ ON RESPONDENT'S PROCESS.

The prior art patents to Pielsticker, Hall and Ellis (*ante*, pp. 61-70), which we now discuss, do not completely anticipate Dubbs, in that no one of them discloses the vital two-step "fireless cooker" principle of cracking with which Dubbs (and Behimer before him) solved the carbon problem. They do, however, disclose the steps of reflux return to the coil and withdrawal of residue. Therefore, in petitioner's view of Dubbs's claims as being directed wholly to these so-called "clean circulation" steps in any kind of cracking process, they are anticipated by these patents.

The Third Circuit Courts, in the *Root* case, held that Pielsticker and Hall (Ellis not being before them) did not disclose "clean circulation." They laid much stress on the lack of commercial use of the processes of these patents, entirely ignoring the fact that the Patent Act does not require such use as a condition precedent to the anticipatory effect of a prior art reference.

In the Seventh Circuit, the District Court agreed with the Third Circuit on this issue, the majority of the Court

of Appeals did not pass on it, and the concurring Judge held Dubbs to be anticipated.

However, in the Tenth Circuit the Court was unanimous in holding that all three patents disclose "clean circulation." Thus in *Texas Company* v. *Anderson-Prichard Refining Corporation*, 122 F. (2d) 829, the Court of Appeals for the Tenth Circuit,* said (p. 834):

> "The prior patent art had broadly taught the steps in a cracking process of returning reflux to the heating zone for further treatment and continuously withdrawing the carbon-containing residue and not returning it to the system."

No one of these prior art patents was cited by the Patent Office against the Dubbs patent in suit, and, therefore, Dubbs has no presumption of validity over this art.

The Pielsticker Patents.—Neither the petitioner, nor any court, has yet pointed out wherein Pielsticker fails to disclose the "clean circulation" steps of residue withdrawal and reflux return to a supply tank or coil inlet.

As to the residue withdrawal feature, Pielsticker refers (pat. p. 2, line 32, British patent, 1308, VII, 3532) to the "valve N, for the removal of **tar** or **residue**." We fail to see how any patentee could have chosen language that could have been any clearer.

As to reflux return Pielsticker is equally explicit. He teaches the return of condensate from the condenser P either to the supply tank A "or into the heating coil" (VII, 3534, claim 6). Dubbs's patent discloses the return of reflux either to a supply tank or to the inlet of the B

* In the lower court, Judge Kennedy had likewise held in the *Anderson-Prichard* case that these prior art patents disclosed clean circulation (32 F. Supp. 347, at p. 354).

tubes. Both methods of return are clearly disclosed in Pielsticker.

The District Court followed petitioner in its contention* that Pielsticker's dome P is an entrainment knockout, instead of a condenser or dephlegmator. But here, again, neither petitioner nor any court has yet explained how this conclusion could be reached in the face of Pielsticker's express statement (VII, 3532, lines 45-7) that "the heavier portion of them [vapors] are caused to *condense*" by "contact with the inner surface of the Dome P," and his reference in claim 6 of the British patent to "*oil vapours condensed* in the dome" (VII, 3534). "Vapours condensed" means what it says—a liquid formed as the result of condensing vapor—not droplets of entrained liquid which have never been vaporized. In *Texas* v. *Anderson-Prichard Refining Corporation* (p. 834), the Tenth Circuit Court of Appeals held that Pielsticker taught the step of "returning reflux to the heating zone for further treatment."

The District Court also held that Pielsticker's process appears to be nothing more than simple distillation (VI, 3040). What, then, is the meaning of those passages in Pielsticker where he speaks of making "lighter gravity oils" (VII, 3533, line 7)? Why his mention of carbon formation in his tubes (VII, 3532, line 22) which Universal, in the *Warner-Quinlan* case *when it was a defendant*, stoutly maintained, as we now maintain, was a clear teaching of cracking?

The cracking process so clearly disclosed to Universal in the *Warner-Quinlan* case has now changed with the

* In the *Warner-Quinlan* case, petitioner insisted that Pielsticker's dome was a condenser, to separate reflux from the desired product in order to return this reflux to the supply tank A (*ante*, pp. 64-5).

change in its status from defendant to plaintiff, to its present theory that Pielsticker only discloses a simple distillation operation, or a vapor phase process to produce very light oil or permanent gas.

The teachings of the Pielsticker patent have not changed since petitioner correctly described them in the *Warner-Quinlan* case. The change has come in the petitioner's view of Pielsticker—then as defendant, now as plaintiff. Litigants and their counsel tend to bring the courts into disrepute when they are permitted thus to prevail in utterly inconsistent positions in successive lawsuits.

Ellis Patent No. 1,396,999.—This prior art patent was not before the Third Circuit courts in the *Root* case. In the *Globe* case at bar the District Court held (VI, 3040) that Ellis's system "as shown by his drawings is such as to prevent the return of reflux condensate to the heating tubes." How this prevention is shown in the drawings the court did not explain.

There is nothing in Ellis's drawings (VII, 3352-6) to "prevent" the running of a line from the top petcock 11*b* of the bubble tower (VII, 3354) to convey this sidestream to the inlet of the coil as Ellis teaches. Obviously, the man skilled in the art, prior to Dubbs's filing date, reading Ellis's disclosure, could, if he chose, use any means then known, such as (1) Pielsticker's supply tank, or (2) hydrostatic head, or (3) the Thompson pump, to carry out Ellis's clear teaching that the reflux be "returned to the decomposing tubes" (VII, 3358, lines 10-11).

Ellis says (VII, 3358, lines 13-14) that the residue "is collected, and suitable disposition made thereof" and although he discloses neither pipes nor tanks for this purpose, no one could contend that his disclosure is on this

account insufficient. Ellis also says to "return" the reflux to the decomposing tubes—without going into further detail. Why should he? The man skilled in the art, is, after all, *"skilled,"* and very little skill would be required to use Pielsticker's supply tank, or the well-known principle of hydrostatic head in returning Ellis's reflux.

Hall Patent No. 1,175,910.—The question of whether Hall teaches a recycling process revolves mainly around the meaning to be given to the patentee's statement ('910 patent, p. 3, lines 2-4, VII, 3203) that the condensate which he calls "light residue" (pat. p. 2, line 1) "is used as raw material for a second run through the cracking coil 4." Whether this means immediate return, or the return on some subsequent occasion is really immaterial for there is certainly no invention in returning the reflux immediately, over storing it and then charging it on some other day. Immediate return to a coil may be effected either by hydrostatic head, or by the use of a supply tank as disclosed in Pielsticker, or by a hot oil pump. We have shown that both hydrostatic return and the supply tank were known in Hall's time, and that Thompson's hot oil pump was available to the art in 1917, almost two years before Dubbs's filing date.

Hall clearly taught that where a clean reflux is obtained by dropping the pressure and cooling the effluent from the coil in the first dephlegmator, the condensate from the second dephlegmator could be used for immediate return to the coil. Thus, in Hall's '796 patent, he says (VII, 3232) that by these steps "this second condensate (termed 'light residue') can be *directly* employed for making a second 'run' through the apparatus, without filtration or other preliminary treatment."

The District Court's conclusion that the process of the Hall No. 1,175,910 patent was used by The Texas Company at Bayonne, is not supported by the record. The Bayonne operation was clearly not that of the '910 Hall patent.

First. The Hall '910 patent shows and uses two dephlegmators beyond the cracking coil, whereas the operation at Bayonne interposes a column between the cracking coil and the two dephlegmators (deFlorez, II, 848; DX. 623-A).

Second. The '910 patent provides for an abrupt pressure drop between the outlet of the cracking furnace and the inlet of the first dephlegmator. The operation at Bayonne did not have any such abrupt pressure drop at the outlet of the cracking furnace (deFlorez, II, 850).

Third. The Hall '910 patent definitely teaches that the two dephlegmators should be sufficiently cooled so as to obtain the desired heavy and light residues. In the Bayonne operation, this cooling of the dephlegmators was not sufficient (deFlorez, II, 849).

Fourth. In the Hall '910 patent, the vapors from the coil enter at the very bottom of the first dephlegmator, and, therefore, must bubble through the liquid therein (III, 1221-2). In the Bayonne operation (deFlorez, II, 849) the vapors from the column entered the first dephlegmator above the liquid level, and, therefore, were not subjected to any cleansing action.

The Bayonne operation more nearly follows the Hall patent No. 1,194,289 (DX. 824, VII, 3212). This patent, like the Bayonne operation, (1) shows a column and two dephlegmators, (2) no abrupt pressure drop at the outlet of the cracking furnace, (3) no cooling means for the column or for the dephlegmators, and (4) vapors entering the first dephlegmator substantially above the bottom.

These process differences between the Bayonne operation and the process of Hall's '910 patent account for the clean

reflux of the patent, making it suitable for immediate return to the coil inlet.

The District Court's conclusion that the Bayonne operations "proved inoperable" is not, we respectfully submit, justified by the record.

The Bayonne operations were not in the record in the *Root* case. They were clearly not "inoperable." They were unprofitable, but this is a very different thing. The facts regarding these operations are set forth in the deposition of Luis deFlorez, an outstanding petroleum engineer (II, 846-868). With a kerosene charging stock, the operation was entirely successful. Mr. deFlorez testified (II, 852) that he made one run on kerosene which lasted for "about two weeks continuously which was very satisfactory and no shut-down for carbon." Mr. deFlorez further testified (II, 852-3) that he considered "the vapor phase plant at Bayonne was fully operative. It illustrated very well the fact that you could run kerosene; and so far as a high temperature once-through process, I think it was a good job. The plant would run about 500 barrels a day, and I had it running pretty continuously. The product or distillate I obtained in the operation was yellow, it was highly unsaturated, it had a bad odor; in other words, it was typically a vapor phase product as we knew it in those days." Mr. deFlorez identified certain run sheets and plant data of the operations at Bayonne (II, 853-4).

The Bayonne operations are material in this case, because they show a prior art commercial process with continuous feed and with residue draw-off and non-return. If this latter feature were, as petitioner's Brief asserts, Dubbs's claim to novelty, his patent would be invalid on the Bayonne operations.

Although Hall's '910 process was never used by The Texas Company, this cannot affect the anticipatory effect of its plain disclosure.

We submit that the views of the Third Circuit courts and of the District Court in the Seventh Circuit on the three prior art patents—Pielsticker, Ellis, and Hall—should not prevail, and that their teachings are correctly interpreted by the Court of Appeals for the Tenth Circuit in *The Texas Co.* v. *Anderson-Prichard Refining Corp.*, 122 F. (2d) 829. We do not find in Judge Holly's decision in the case at bar, nor in the decisions in the *Root* case, any detailed consideration of these patents, nor any explanation of why certain plain statements in them should not be given their obvious effect.

V.

THE EGLOFF PATENT.

The District Court in the case at bar in its Opinion (VI, 3051), Findings (Nos. 36, 37, 38, VI, 3059-60), and Conclusions (No. 12, VI, 3061) found that the process of the Egloff patent was useless, had never been used commercially, and that the patent was invalid for lack of invention and utility. The majority of the Seventh Circuit Court of Appeals neither affirmed nor reversed Judge Holly on this issue but based its decision on non-infringement. The concurring member of the Court (Lindley) was content merely to hold Egloff invalid. The Third Circuit courts followed Universal's expert's exposition of Egloff.

A. Egloff's Is a Pressure Distillation, Two-Step, Liquid Phase Process.—The Egloff patent states that it (p. 1, line 11, VII, 3095) "refers more particularly to a process in which the oil is distilled under heat and pressure." Thus, Egloff classifies his process in a category known in the art as "pressure distillation" systems, of which Burton and Burton-Clark were well-known examples. In a "pressure distillation" system a large body of oil is cracked in a capacious tank or container equipped with vapor outlets so that the vapors escape substantially as rapidly as they are formed, and in which the liquid oil is cracked and distilled under pressure, the purpose of the pressure being to hold the oil in a liquid condition at a cracking temperature (Smith, III, 1105).

The only place in the apparatus of the Egloff patent where a pressure distilling cracking operation can be conducted is in the huge expansion chamber 12, where all the foregoing characteristic conditions are present.

The large dimensions given for the expansion chamber (pat. p. 1, lines 45-6, VII, 3095)—"68 inches in diameter and 40 to 60 feet long"—are entirely appropriate for the type of chamber used in pressure distillation, drum cracking processes. The indefinite size and length given for each of the coils (pat. p. 1, line 32, VII, 3095)—"a continuous length of several hundred feet of two to eight-inch pipe"—is sufficient for preheating the oil in such a process.

The *only* process teaching of the patent is contained in the brief paragraph beginning on page 1, line 86, and ending at line 102. The temperatures there given of 700° for the coil 5, and 770° for coil 6, if maintained in the expansion chamber, are appropriate for a pressure distillation cracking process (III, 1108-9). The pressure of 135 lbs.

in the expansion chamber is likewise typical of pressure distilling (Smith, III, 1108-9).

Egloff's process teaching is specific in requiring that the oil be delivered from both coils to the expansion chamber "in substantially liquid phase" (pat. p. 1, lines 92 and 101-2). Here, again, is a plain indication that Egloff intends to crack the oil in its liquid state in the expansion chamber (Smith, III, 1110). If the oil were vaporized in the coils, it would pass in and out of the expansion chamber in vapor form without remaining therein for a sufficient time for cracking to be accomplished. Being delivered to the expansion chamber in the liquid phase, it necessarily follows that the oil will not vaporize therein save as the result of cracking and that the oil will be cracked in the liquid state (III, 1110). This, again, is pressure distillation. The expansion chamber is unheated, and the temperature of the oil therein depends entirely on the heat it has previously acquired in the coils 5 and 6 (III, 1109).

In such a process there can be no possible advantage in raising the reflux to a temperature of 770° in coil 6, and the raw charge to a temperature of 700° in coil 5, and then mixing the two streams together and cracking the mixture in the expansion chamber (Smith, III, 1111). Indeed, petitioner claims no advantage for Egloff until it has first effected an unjustified transmutation of his pressure distillation system into respondent's antithetical coil cracking process.

B. Egloff's Temperatures and Pressures Are His Only Process Teaching; They Are Not a Mere Example.—Petitioner says (Br. p. 128) that the temperatures, pressures, and liquid phase teachings given in the paragraph of the patent on page 1, beginning line 87 (VII, 3095) are mere

illustrations of one specific operation in the patent. This is not so. This paragraph contains the only teaching of process steps and cracking conditions in the entire patent. Omit this passage, and all that is left is a meaningless catalog of old apparatus, and a description of the nature of the charging stock.

Petitioner's inconsistency with respect to the "illustrative run" of Dubbs and the "illustration" in Egloff is illuminating. When referring to the former, petitioner would allow no departure from the precise conditions given, in order to bottom thereon its argument of the inevitability of vaporization, *i.e.*, vapor "generation" in the B tubes. When referring to Egloff, petitioner says that he merely gave an illustration of a specific operation and, therefore, any temperatures and pressures may be used that would make the process work, regardless of whether the data selected would result in the type of operation taught in the patent.

Petitioner's contention in the case at bar that Egloff's meager process teaching is merely an illustration to be departed from at will, to make it read on an entirely different process, is untenable in view of the decision in *Silica Products Co.* v. *Haydite Co. et al.* (C. C. A. 7), 42 F. (2d) 865, where it was said (p. 869):

> "As to the process employed by appellees, it is contended that it is materially different from that of the Olsen patent. The court found that in several respects this was true. **The process or method pointed out in the Olsen patent is decidedly meager, but it must not for that reason be accorded application broader or more inclusive than if it were more definitely indicated.**
>
> "All that is revealed by Olsen on the important subject of burning the rock is that he subjects it 'to a temperature of 2000 degrees Fahrenheit or above for a period determined by the nature of the rock, so that

all organic matter therein is destroyed and it is reduced to a light porous, hard material'; whereas, the evidence shows that in appellees' process the crushed shale enters the kiln at 600 degrees, remaining at that temperature for a considerable time until it has passed along about thirty feet of the kiln, and when about ten feet from the discharging end it is subjected to a high temperature for a very short time. **When a process patent discloses that the temperature and the time of exposure thereto is an important and distinguishing element of the process, a departure therefrom will, in general, be a departure from the process of the patent.''**

C. Egloff's Is Not a Coil-Cracking Process Like Respondent's.—To escape from the admitted lack of utility in separate heating of reflux and charging stock in a tube heating, drum cracking, pressure distillation system, such as Egloff's, petitioner attempts to construe the patent as though it taught a coil cracking process.

In reading Egloff's claims on respondent's operation, petitioner seizes (Br. p. 48-50) upon superficial similarities of apparatus in Egloff and respondent. To be sure, both have two coils, an enlarged vessel, a dephlegmator, and a condenser, but all these were old long before Egloff. Moreover, nothing is to be learned in an oil cracking process from a mere similarity in apparatus (Reiman, III, 1182-3). For example, the reaction chamber used by Dubbs's licensees and the respondent's vapor separator are both cylindrical vessels, but in the first, cooling is carefully avoided, and temperature and pressure conditions are carefully maintained to *cause* cracking, while in the second, cooling is deliberately effected, and conditions are arranged to *stop* cracking. Therefore, we cannot say that Egloff is a coil cracking operation merely because he provides coils. Nor can it be assumed that Egloff's expansion chamber is the equivalent of respondent's vapor separator merely be-

cause both are cylindrical vessels. We must seek enlightenment in the process steps and the conditions of temperature and pressure and, in Egloff, these are flatly contradictory to a coil cracking operation. The low temperatures of 700° in the coil 5 and 770° in the coil 6, are entirely ineffectual in a coil cracking process (Smith, III, 1108-9). These temperatures would require a long time factor to bring about substantial cracking and, as Mr. Smith said (III, 1109):

> "* * * you just don't get that long time in passing the oil through a coil. You have to hold the oil in some container which will hold a lot of oil in order to get substantial cracking" [at such low temperatures].

Petitioner pins its whole case (Br. p. 129) on Egloff as a coil cracking process to the statement in the patent (p. 1, lines 103-7, VII, 3095): "It will be thus seen that the reflux condensate is continuously subjected to recracking, but at different conditions of temperature or pressure, or both, than that to which the raw oil is subjected." *So far as we are able to ascertain this is the only passage from Egloff's specification quoted in petitioner's Brief.**

Obviously, the word "recracking" presupposes an initial cracking elsewhere, and it is perfectly evident that this "recracking" is the further slight cracking of the reflux following after the cracking of the body of oil in the expansion chamber, where the main cracking in Egloff's pressure distilling process takes place (Smith, III, 1111). Even petitioner's expert, Dr. Brown, who, on redirect examination, tried to interpret this "recracking" as the main cracking of the process (II, 779) could estimate only 3% cracking in the coil as against 10% to 14% in the chamber

* The other supposed descriptions of Egloff are descriptions of respondent's operation.

(II, 772)—indicating a relative proportion of not more than 20% of the cracking in the coil to not less than 80% in the chamber.

Aside from the low temperature and insufficient time factor, utterly inappropriate for coil cracking operations, we have Egloff's definite teaching that the oil from both coils (5 and 6) is to be delivered to the expansion chamber in "substantially liquid phase." If substantial cracking occurred in coil 6, the oil would be substantially vaporized therein, as it is in respondent's coil. The liquid phase requirement, under Egloff's pressure conditions, limits the amount of "recracking" in Egloff's coil 6 to mere incipient cracking.

Furthermore, any inference of substantial cracking in coil 6 that might be raised by the reference to "recracking" therein, is dispelled by reference to the file-wrapper of the patent (PX. 503, IV, 1618). In the amendment of December 8, 1922 (Paper No. 3, IV, 1629), Egloff submitted a claim reading as follows:

> "3. A process of cracking oil consisting in passing raw oil continuously through a coil to be subjected to cracking conditions of temperature and pressure, in introducing the *oil* to an expansion chamber where vaporization occurs, * * *"-etc.

In the Office Action of October 17, 1923 (Paper No. 4, IV, 1630), the Examiner said:

> "Claim 3, line 4, before 'oil' insert—heated—or—cracked—."

Here, the Examiner was clearly requiring Egloff to specify whether the oil to be delivered to the expansion chamber was already actually cracked, or merely heated. Egloff was thereby put on notice of the fact that if he used "heated" it would be understood by the Patent Office

that "cracked" was not intended, and that if he meant "cracked," he should say so by using the proper word.

Egloff duly complied with the Examiner's requirement, and in the next amendment (Paper No. 5, IV, 1632-3), submitted three new claims in each of which the adjective used was "heated" or "reheated" with respect to the oil delivered to the expansion chamber from both coils. The oil was not described as "cracked." The same thing holds true of the claims thereafter submitted which were finally allowed. In every one of them, the condensate is called "heated," and not "cracked," and the charging stock is similarly characterized. From this, it is apparent that the word "heated" in the claims was deliberately chosen and that the word "cracked" was just as deliberately discarded, as the qualifying adjective to indicate the condition of the oil in the respective streams when delivered to the expansion chamber. By so doing Egloff recognized the difference between "heated" and "cracked" and "proclaimed his abandonment of all that is embraced in that difference." *Exhibit Supply Co.* v. *Ace Patents Corp.*, 315 U. S. 126, at page 136.

Petitioner has never contended, and does not now contend, that Egloff's separate heating of reflux and charging stock has any utility unless Egloff be construed as a coil cracking process. As this cannot be done, it is clear that District Judge Holly was right in holding that Egloff is invalid for lack of utility, and that the Seventh Circuit Court of Appeals was equally right in holding that Egloff's claims were not infringed by respondent's coil cracking, substantially vapor phase process.

D. On Petitioner's Own Proofs, Egloff Is a Step Backward From Dubbs.—Egloff is supposed to be an improve-

ment over the Dubbs patent, which, of course, is prior art to Egloff. This improvement is said to reside in Egloff's teaching of heating the reflux separately from the charging stock.

In Dubbs, the reflux mixes with the charging stock before it enters the B tubes. Petitioner's expert, Dr. Brown, claimed great advantages for Dubbs in this "dilution" of the charging stock with reflux, which he said (II, 657-8) had a solvent effect on the stock and tended to prevent carbon deposits.

Obviously, if combining the reflux and charging stock is an advantage in Dubbs, the separate treatment of each is a disadvantage in Egloff.

E. Petitioner's Attempt to Read into Egloff Respondent's Prior Art Step of Creating a Charging Stock in Situ. —Entirely without support from the Egloff patent, petitioner asserts (Br. pp. 127-8) that respondent's step of distilling out a clean charging stock in the vapor separator is taught in Egloff. This is not true. Egloff has no need for a clean charging stock. He mixes the effluent from coil 6 (clean) with the topped crude in coil 5 (dirty) immediately before the oil from both coils enters the expansion chamber where it is cracked. Had Egloff any thought of creating a clean charging stock *in situ* he would, like respondent and the prior art have reduced pressure in the chamber, thus obtaining a really adequate vaporization of the topped crude oil from coil 5. Instead, Egloff maintains the same pressure in the chamber (135 lbs.) as he maintains in coil 5, and he does this for the sole reason that he wants to maintain cracking conditions in the chamber.

Furthermore, even if Egloff could be credited with re-

spondent's step of preparing a charging stock *in situ*, there is no invention in this step, entirely apart from the fact that it was old in the patent art.

The prior art commercial processes employed a preliminary step of preparing a clean stock by distillation. Respondent does the same thing, but uses the contained heat of the stream from its cracking coil to distill out a clean stock from the reduced crude from the low temperature operation. Respondent merely does in one operation what the prior art did in two, and thereby saves some heat and extra equipment (Smith, III, 1128-9). This involved nothing more than the skill of the calling.

F. Invalidity for Lack of Utility and Disclosure.—The Egloff patent is, in the highest degree, non-informative. The only objects stated in the patent are (pat. p. 1, line 16, VII, 3095) "to subject the reflux condensate to different conditions of temperature or pressure or both than that to which the raw oil is subjected," and (pat. p. 1, line 20) "to, if desired, subject part of the apparatus to vacuum action." The patent is silent as to what advantage is to accrue from the achievement of either object.

In the only process teaching in the patent (pat. p. 1, lines 86-102, VII, 3095), the temperatures are inappropriate, even for the pressure distillation type of operation which he teaches, for the reason that Egloff shows no way of maintaining in the expansion chamber the temperature of the combined stream of reflux and raw feed which would be somewhere between the 770° of coil 6 and the 700° of coil 5 (Smith, III, 1110). Egloff gives no consideration to the fact that vaporization and cracking consume heat and that there would, therefore, be a temperature drop due to these factors in the expansion chamber

(Smith, III, 1109) which would cause such a low temperature as to preclude cracking. Unlike Dubbs, who can mildly heat his C tubes, Egloff shows no means of heating his chamber. There can be no vaporization in the expansion chamber save as the result of cracking, and Egloff does not disclose conditions which would cause substantial cracking therein. There can be no reflux without vaporization so, as Mr. Smith expressed it (III, 1110), "you are up against the difficulty of getting heat to bring about the cracking, to bring about vaporization, so that you can get reflux to get heat. It works in a sort of vicious cycle there for which there doesn't seem to be any solution."

Even if we should assume, because cracking temperatures and pressures, in pressure distilling operations, were well known prior to Egloff, that the man skilled in the art might substitute his own knowledge for Egloff's disclosure in this respect, the resulting process would still be a pressure distilling operation, in which Egloff's separate heating coils possess no utility. There is no ground for asking the man skilled in the art to substitute for Egloff's type of operation, an antithetical coil cracking operation. It is in this connection that petitioner (Br. p. 129) unfairly twists the testimony of respondent's expert witness Smith. Petitioner says that Smith "frequently admitted that it would be within the skill of the art to use temperatures higher than the temperatures" disclosed in Egloff's patent. Smith admitted no such thing. He said that (III, 1109) there was no disclosure in Egloff of a coil cracking process, but that (III, 1169) "if the man skilled in the art knew he wanted to crack in the coil 6 he could run to higher temperatures and accomplish cracking, or he could make the coil longer."

The Egloff patent falls within the condemnation of this Court in *Atlantic Works* v. *Brady*, 107 U. S. 192, where it was said (p. 200):

> "The design of the patent laws is to reward those who make some substantial discovery or invention, which adds to our knowledge and makes a step in advance in the useful arts. Such inventors are worthy of all favor. It was never the object of those laws to grant a monopoly for every trifling device, every shadow of a shade of an idea, which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufactures • • • "

G. Invalidity in View of the Prior Art If Egloff's Claims Be Read on Respondent's Operation.—If Egloff be construed to cover a coil cracking operation, making a charging stock *in situ*, then he is invalidated by the clear disclosures of the prior art patents to Greenstreet (VII, 3476) and Alexander (VII, 3364).

As petitioner admits, "clean circulation" was old when Egloff filed, and functions in Egloff precisely as in the prior art.

Opposite this page, we illustrate the process of the Egloff patent as misconstrued by petitioner to make it a coil cracking process. We also show the Alexander and Greenstreet patents, and the respondent's operation, with corresponding elements positioned in vertical columns. The fresh charge is shown in blue, residuum in brown, the vapors of the combined feed and product in red, combined feed in green, and the vapors of the product in purple.

Greenstreet (VII, 3482-3, pat. p. 2, line 70 to p. 3, line 17) and Alexander (VII, 3378, pat. p. 6, lines 42-100) both disclose the step of making *in situ* a clean charging stock for the cracking coil, and this step functions no differently

in respondent's operation than in Greenstreet and Alexander. Egloff's two-coil set-up is fully disclosed in Greenstreet.

Neither Greenstreet nor Alexander was cited against the Egloff application in the Patent Office.

H. Non-Infringement of the Egloff Patent.—Respondent's is a coil cracking operation and not a pressure distillation process, like Egloff's (Smith, III, 1132, 1141). Respondent's operation has no equivalent of Egloff's expansion chamber where a body of liquid oil is supposed to be maintained under cracking conditions so as to accomplish pressure distillation cracking. In respondent's vapor separator, everything possible is done to stop cracking, consistent with the necessary function of separating the residuum from the clean cracking stock and the desired product.

Pressure in Egloff's expansion chamber (135 lbs.) is the usual pressure appropriate to pressure distillation processes (75 lbs. and up, Smith, III, 1108-9). Pressure in respondent's separator is a mere 26 lbs.—just enough to force the products through the bubble tower and condenser (Smith, III, 1132), and is entirely inappropriate for pressure distillation cracking.

Egloff's process copies the Dubbs two-step "fireless cooker" cracking method, whereby the cracking heat is imparted in one step and the principal cracking is accomplished in an unheated chamber. Respondent heats and cracks in the same step and cannot make carbon in any substantial amount anywhere in the process without failure of the apparatus.

Therefore, under *Westinghouse* v. *Boyden*, 170 U. S. 537, and *The Texas Company* v. *Anderson-Prichard Refining*

Corporation, 122 F. (2d) 829, the respondent's operation does not infringe the Egloff patent because the two processes are utterly unlike in all fundamental respects.

I. The Claims of the Egloff Patent Are Not Infringed When Construed in the Light of the Specification.—Of all Egloff's claims, claim 1 alone calls for the maintenance of superatmospheric pressure in the "enlarged zone." Without this pressure, Egloff's pressure distilling operation would not function at all, even though his disclosure were operable. The other claims say nothing about pressure in the chamber. If they are to be construed as describing the only process which Egloff attempts to disclose, it is necessary to read into them this pressure. We submit that this is proper. The claims must always be read in the light of the specification.

But if Egloff's claims, to be valid, must have read into them the specification teaching of superatmospheric pressure, then it should follow that they also must have read into them the specification teaching that the oil in both coils is delivered to the expansion chamber in "substantially liquid phase," in which case they are not infringed. Both elements are necessary to the operability of Egloff's process. They are not necessary in respondent's process where pressure has no part in the cracking operation, and the oil in the coil is in substantially vapor phase.

Taking claim 1 as an example,

(a) In the expansion chamber, the call is for:

> "• • • maintaining a body of heated hydrocarbons in an enlarged zone where substantial vaporization occurs, • • •" and
>
> "• • • maintaining a superatmospheric pressure • • • on the body of hydrocarbons in said enlarged zone."

The words "maintaining a body of heated hydrocarbons" under "superatmospheric pressure" reflect the time-temperature-pressure elements necessary to pressure distillation cracking. If, as petitioner infers, the chamber were merely a vapor separator like respondent's, there would be no purpose in "maintaining" a "body" of "heated" oil therein under "superatmospheric pressure."

The "heat" denoted in the phrase "heated hydrocarbons" is that resulting from temperatures (between 700° and 770°) which, were they maintained* in the enlarged zone, would be entirely appropriate for pressure distillation of the body of liquid oil in the chamber.

This element of the claims, when considered in the light of the specification, is a call for cracking of the pressure distillation type in a large drum, where a large body of oil is maintained at the requisite temperature for a sufficient time to effect cracking. Respondent just as clearly does not conduct such an operation and for this reason, if for no other, does not infringe the claims.

(b) With respect to the coils, the claim says:

> "* * * passing the reflux condensate in an advancing stream through a heating zone where it is subjected to a cracking temperature, in delivering the said **heated** condensate to the enlarged zone, in simultaneously heating an independent advancing stream of charging stock to a cracking temperature, in delivering the said **heated** charging stock to said enlarged zone * * *."

It should be noted how perfectly this language fits the first step of the two-step cracking process which Egloff attempts to disclose. The respective streams in the coils

* They cannot be therein maintained because of heat loss from vaporization and cracking.

are to be raised "to a cracking temperature" only. As the result of this, the streams are delivered to the enlarged zone in a "heated," not "cracked," condition.

The claims do not, in express words, reflect the specification teaching that the oil from both coils must be delivered to the expansion chamber in "substantially liquid phase," but this clear instruction must be read into the claims, for, unless the oil is delivered to the chamber in "substantially liquid phase" it would be impossible to maintain therein the body of liquid hydrocarbons necessary for Egloff's pressure distilling operation.

Furthermore, if construed to mean "in substantially vapor phase" (as in respondent's operation), the claims would be invalid for lack of any disclosure of this condition in the specification, and, in fact, would be directly contradictory thereto.

In *Schriber-Schroth Co.* v. *Cleveland Trust Co., et al.*, 305 U. S. 47, (the first *Schriber-Schroth* case) the patentee, by amendment, had sought to add matter that was contradictory or antithetical to his original disclosure and had obtained claims embodying this antithetical principle. This Court held the claims invalid, saying (p. 58):

> "• • • If invention depends on emphasis of one quality over the other, • • • the statute requires that emphasis to be revealed to the members of the public, who are entitled to know what invention is claimed. That is not accomplished either by naming a member having inherent antithetical properties or by ascribing to it one property when the other is meant."

So of Egloff. The public was not informed that his process called for and covered an operation "in substantially vapor phase" by his explicit specification teaching that the oil in the coils was "in substantially liquid phase."

If, under the doctrine of the *Schriber-Schroth* case, Egloff could not have amended his *specification* to add the contradictory "vapor phase" condition of the oil in his coils, then petitioner in this case cannot by "interpretation" of the claims accomplish the same result.

Under the fundamental rule of law that the claims may not transcend the invention actually disclosed in the patent, respondent does not infringe the liquid phase, pressure distillation claims of the Egloff patent.

Because of its special applicability to Egloff's claims, which petitioner contends (Br. pp. 48-50) "read on" respondent's operation (although merely as a matter of words) we cite *Electro-Dynamic Co.* v. *United States Light & Heat Corporation*, 278 Fed. 80 (C. C. A. 2), where Judge Hough said (p. 84):

> "It is no longer necessary to multiply citations to show that claims are to be construed in the light of the contribution to knowledge actually made by the inventor, or that mere ability to fit to a thing the words of a claim does not prove infringement. Let it be assumed that (*e. g.*) the first claim, at least, will 'read on' defendant's system; it remains to inquire whether that (and other) claims, construed consistently with the patentee's actual achievement, justify the finding that there has been that substantial appropriation which is always the essence of the tort known as infringement.
>
> "Even the broadest or most loosely drawn method or combination claim, must be fortified by a disclosure of how the method is to be practiced, or of the kind and nature of the elements combined. * * *"

Conclusion.

For the many reasons pointed out in this brief and sustained by the record, the Dubbs and Egloff patents in suit are invalid, and, in any event, not infringed. The judgment of the Seventh Circuit Court of Appeals should be affirmed.

Respectfully submitted,

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APPENDIX.

DEFINITION OF "VAPORIZATION."

(a) Dictionaries.

Encyclopaedia Britannica, 14th Edition, Vol. 22, page 979:

"**vaporization**, a general term denoting the change of state of any substance from solid or liquid to vapour."

The Columbia Encyclopedia, page 1825:

"Vaporization is concerned with the change of a substance into a gas or vapor."

Oxford Dictionary, Vol. 10, Part II, page 42:

"The action or process of converting, or of being converted, into vapour."

Webster's New International Dictionary, 1915 Edition, page 2266:

"**vaporization**, Act or process of vaporizing, or state of being vaporized; artificial formation of vapor; specif., conversion of water into steam, as in a steam boiler.

"**vaporize**, *v.t.* To convert into vapor, as by the application of heat, whether naturally or artificially.

"**vaporize**, *v.i.* To become converted into vapor."

Funk & Wagnall's Practical Standard Dictionary, 1934, page 1235:

"• • • **vaporize**, **vaporise**, *v.t.* & *v.i.* To convert, or be converted into vapor. • • • **vaporization**, *n.* The act or process of vaporizing, or the state of being vaporized. • • •"

The Encyclopaedic Dictionary, (1888) Vol. 7, page 408:

"**vaporization**, The act or process of vaporizing; the artificial formation of vapour; the state of being vaporized.

"**vaporize**, *v.t.* & *i.*

"**A.** *Trans.* To convert into vapour by the application of heat or artificial means; to sublimate; to cause to evaporate.

"**B.** *Intrans.* To pass off in vapour; to evaporate."

The Century Dictionary and Cyclopedia, 1911 Edition, Vol. X, page 6697:

"**vaporization.** The act or process of vaporizing; the formation of vapor, or the state of being converted into vapor; treatment with vapor. • • •

"**vaporize**, v.

"**I.** *trans.* To convert into vapor by the application of heat, reduction of pressure, or other means; cause to evaporate.

"**II.** *intrans.* To pass off in vapor; as, sulphur or mercury vaporizes under certain conditions."

(b) Textbooks.

First Principles of Physical Science, by David A. Wells (1863), at p. 194 (DX 648, V, 2459):

"1284 *What is meant by vaporization?*

"The *conversion* of a *solid* or *liquid into vapor;* as snow or water is converted into vapor by the heat of the sun."

Physics for College Students, by Henry S. Carhart (1910), at p. 375 (DX 649, V, 2459):

"Vaporization.—*Vaporization* is the transition of a substance from the solid or the liquid state into that of a gas. There are four distinct forms of vaporization, depending on the conditions under which the transition occurs:

"1. *Evaporation*, in which a liquid is converted into a vapor at its free surface at a relatively low temperature, and without the formation of bubbles.

"2. *Ebullition*, or boiling, a rapid evaporation at a higher thermal equilibrium, when the liquid is visibly agitated by internal evaporation.

"3. *Spheroidal state*, in which quiet evaporation, at a lower rate than boiling, goes on with the vapor acting as a cushion between the liquid and a surface at a relatively high temperature.

"4. *Sublimation*, in which a solid passes directly into the gaseous form without passing through the intermediate liquid state.

"Whether the gaseous condition is reached by one of these processes or another, heat is always absorbed, although the vapor formed is at the same temperature as the solid or the liquid from which it comes. The heat absorbed in the transition into the form of a gas is called the *heat of vaporization*."

A Text-Book of Physics, by Louis Bevier Spinney (1925), at p. 196 (DX 650, V, 2459-60):

"If water is placed in an open vessel in a room at ordinary temperature it will be observed to gradually disappear from the vessel. This escape of the liquid by passing into the vapor state, a change which takes place wholly at the surface of the liquid, is called evaporation. If the water is heated until it comes to the temperature known as the boiling point, vapor will begin to form in bubbles within the body of the liquid itself. These bubbles of vapor rise to the top, expanding as they rise into regions of diminished pressure, bursting at the surface and setting free large quantities of the vapor. This formation of vapor within the liquid is known as ebullition, or boiling.

"The boiling point of a liquid may therefore be defined as that temperature at which the bubbles of vapor are formed within the liquid. Evidently this formation of vapor is one kind of vaporization, but it is distinguished from the process of evaporation by the fact that the vapor is formed within the liquid."

Physics, Advanced Course, by George F. Barker (1892), at p. 309 (DX 651, V, 2460):

"**Vaporization of Liquids.**—The process of converting a liquid into a vapor is also called **vaporiza-**

tion. The production of vapor may take place solely from the surface of the liquid, or it may take place throughout its mass. In the former case the vaporization is effected by **evaporation**; in the latter, by **ebullition.**"

Elementary Treatise on Physics, Experimental and Applied, by E. Atkinson (1879), (DX 652, V, 2460):

"**Vaporisation.**—The passage of a liquid into the gaseous state is designated by the general term *vaporisation;* the term *evaporation* especially refers to the slow production of vapour at the free surface of a liquid, and *boiling* to its rapid production in the mass of the liquid itself."

Essentials of Physics for College Students, by Daniel W. Hering (1912), at p. 115 (DX 653, V, 2461):

"• • • The change of a liquid to the gaseous state is vaporization.

• • • • •

"There are three processes of vaporization: (1) evaporation, where a liquid is converted into a gas quietly and without formation of bubbles; (2) ebullition, where bubbles of gas are formed in the mass of the liquid itself; (3) vaporization in the spheroidal state, where a liquid evaporates slowly, although apparently in contact with a very hot substance."

College Physics, by John Oren Reed and Karl Eugen Guthe (1912), at p. 240 (DX 654, V, 2461):

"Vaporization is the process of transforming a substance from the solid or the liquid state into the gaseous state."

The Elements of Physics, by S. E. Coleman (1906), at p. 192 (DX 655, V, 2461):

"The change of a substance from the solid or liquid to the gaseous st[illegible] is called *vaporization.* Vaporization may take [illegible]e at the free surface of a liquid, or within its [illegible]ass at the place where heat is applied. In the [illegible]rst case, the phenomenon is

generally called *evaporation;* in the second case, *boiling.*"

The Elements of Physics, by Henry S. Carhart and Horatio N. Chute (1894), (DX 656, V, 2461):

"**Vaporization** is the act of changing a substance into a gaseous condition. If this change takes place slowly, without producing any noticeable disturbance in the body of the substance, it is called *Evaporation.* If, during the act, the body is visibly agitated, it is called *Ebullition.*"

Physics for Students of Applied Science, by J. Edmond Schrader (1937), (DX 657, V, 2462):

"**Change of State.**—When heat is supplied to substances the following physical changes may take place:

"1. Fusion or melting, a change from the solid to the liquid state. The reverse change is solidification, or freezing.

"2. Vaporization, a change from a liquid to a vapor. The reverse change is condensation.

"3. Sublimation, a change from the solid state directly to the vapor state. The reverse change is condensation.

. . . . . .

"**Vaporization.**—Vaporization is the process of changing from a liquid to a gaseous state. . . . Vaporization may take place under two conditions: If vapor is formed only at the surface, it is called evaporation; if vapor is formed within the body of the liquid, the process is called ebullition, or boiling. The amount of heat necessary to change 1 gm. of a liquid at its boiling point into vapor at the same temperature is called its latent **heat of vaporization.**"

A Textbook of Inorganic Chemistry for Colleges, by James F. Norris (1921), (DX 658, V, 2462):

"The conversion of a gas into a liquid is the process opposite to that of vaporization; it is called con-

densation. In this case heat is set free, the amount being equal to that absorbed in vaporization."

Physics in Everyday Life, by William D. Henderson (1921), at p. 215 (DX 674, V, 2493):

"The process by which a substance changes to a vapor is called *vaporization*. It may take place by boiling, by evaporation, or by sublimation."

A Text-Book in Physics, by William N. Mumper (1907), at p. 198 (DX 674, V, 2493):

"* * * Most liquids may be converted into the gaseous or vapor state by the addition of heat. This change of state, without regard to the conditions under which it occurs, is called *vaporization*."

Mechanics and Heat, by William B. Anderson (1914), at p. 260 (DX 674, V, 2493):

"**Vaporization Defined.**—Vaporization is the general term applied to the process of changing from a liquid or solid to the vapor state. Vaporization takes place in three different ways, *evaporation, ebullition* (Sec. 192), and *sublimation*. * * *

"In whatever manner the vaporization occurs, it requires heat energy to bring it about, and when the vapor condenses an equal amount of heat (the heat of vaporization, Sec. 182) is evolved."

General Physics and Its Application to Industry and Everyday Life, by Ervin S. Ferry (1921), at p. 268 (DX 674, V, 2493):

"* * * The conversion of a liquid or solid into vapor is termed *vaporization*. Four different sorts of vaporization can be distinguished. These are evaporation, sublimation, boiling and the spheroidal state."

Principles of Chemical Engineering, by William H. Walker, Warren K. Lewis and William H. McAdams (1923), at pp. 381, 478 (DX 825, VI, 2994-5):

"If the liquid is in a space in which the partial pressure of its vapor is less than the vapor pressure

it possesses at this temperature, it will proceed to vaporize and its vapor will pass into space. But this change of state is accompanied by the large absorption of heat already noted. If this heat be not supplied from some external source, vaporization will nevertheless continue, and the necessary heat will be taken from the sensible heat of the liquid, with a consequent reduction of temperature. This fall in temperature of the liquid is accompanied by a corresponding decrease in vapor pressure. Finally a temperature is reached where the vapor pressure of the liquid is equal to its partial pressure existing in the space and vaporization will cease.

"Therefore, in order for vaporization to continue, two conditions must be met:

"*First—the heat necessary for vaporization must be continuously supplied.*

"*Second—the equilibrium which forms between the vapor pressure of the liquid and its partial pressure in the surrounding space must be continuously destroyed.*

"If either one of these two conditions be neglected vaporization will be retarded or even stopped.

"By far the most important processes for drying liquids and solids depend upon first vaporizing the water and in this form separating it from the structure of which it formed a part."